Medical Library AUG 19 1940

SERIES 3, Vol. 23, No. 8 AUGUST, 1940

AMERICAN JOURNAL OF OPHTHALMOLOGY

CONTENTS

		PAGE
Concerning the chamber angle. I. Gonioscopy	*H. S. Sugar*	853
Hyperuricemia and inflammations of the eye	*H. C. Kluever*	867
Historic notes on ophthalmoscopy	*E. Jackson*	873
Transplantation of the cornea	*M. Wiener and B. Y. Alvis*	877
Projection method in visual-acuity test	*C. E. Ferree and G. Rand*	882
Binocular anomalies and reading ability	*B. Clark*	885
Metastatic carcinoma of the choroid	*M. M. Kulvin*	892
Clinician's experience with sulfanilamide	*B. Chance*	900
Interesting muscle cases with comments	*R. O'Connor*	904
Blood differential count in chronic glaucoma	*E. M. Blake and J. C. Leonard*	907
Local use of sulfanilamide in trachoma	*K. W. Cosgrove*	911
A self-luminous Placido disc	*D. G. Cogan*	914
Statistics relating to blindness	*C. Berens*	915
Acute serous tenonitis	*H. C. Donahue*	917
Troncoso magnesium implant and seton operation used on same patient	*O. Wolfe and R. M. Wolfe*	920

DEPARTMENTS

Society Proceedings	922
Editorials	931
Book Notices	932
Correspondence	935
Abstracts	936
News Items	970

For complete table of contents see advertising page V

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Subscription price in United States ten dollars yearly. In Canada and foreign countries twelve dollars. Published monthly by the George Banta Publishing Company, 450 Ahnaip Street, Menasha, Wisconsin, for the Ophthalmic Publishing Company. Subscription and Editorial Office: 640 S. Kingshighway, Saint Louis, Missouri. Entered as second class matter at the post office at Menasha, Wisconsin.

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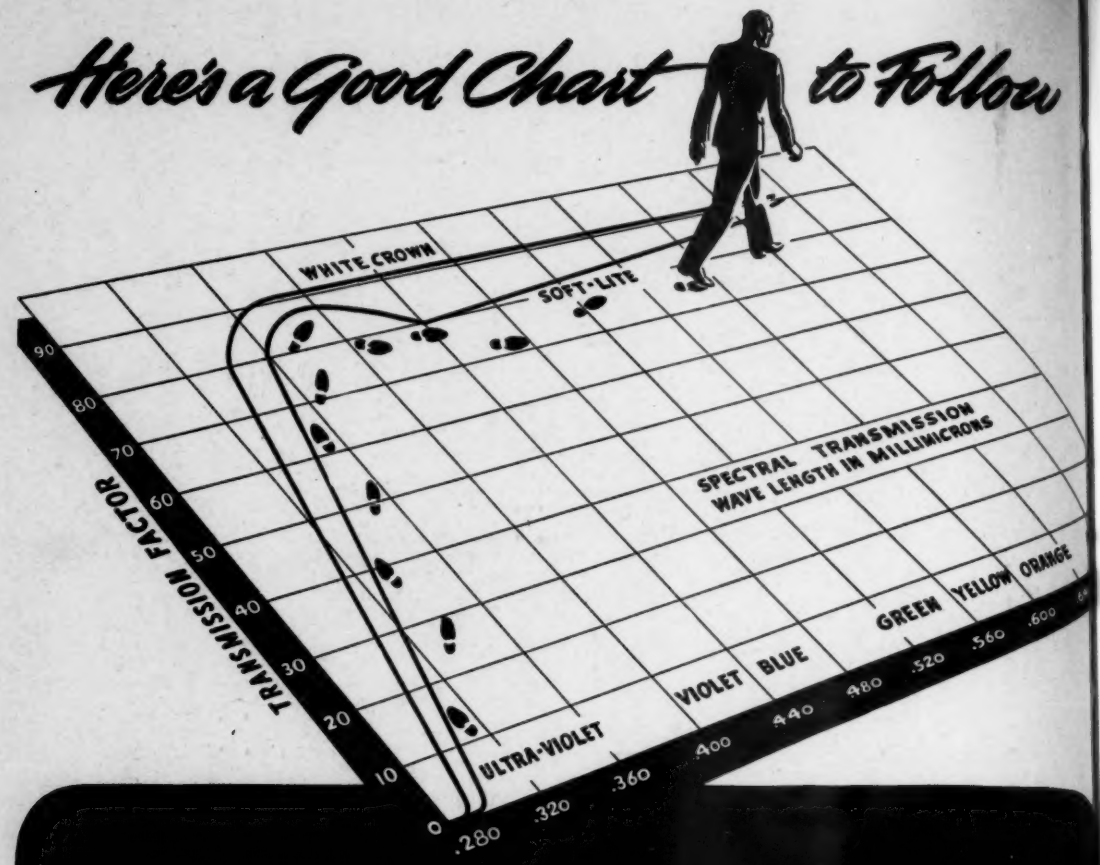

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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 23 AUGUST, 1940 NUMBER 8

CONCERNING THE CHAMBER ANGLE*

I. GONIOSCOPY

H. SAUL SUGAR, M.D.
Chicago

Notwithstanding the important pioneer studies of the angle of the anterior chamber, made during the past 37 years, it has remained for Barkan with his newer methods of gonioscopy to create a practical interest in this phase of ophthalmology. With the awakening has come a demand for more precise knowledge of the technique, anatomical interpretation, and practical application of this method of examination.

The first observation of the angle of the anterior chamber in the living subject was made by Trantas[1] in 1902. He used direct and indirect ophthalmoscopy and succeeded in seeing the nasal and temporal angles in approximately one quarter of his cases. When the chamber was too shallow, he found digital pressure on the globe through the lid helpful. He originated the name "gonioscopy," which was independently proposed in 1921 by Troncoso, 19 years later.

Mizuo[2] in 1914 brought out the fact that the lower chamber angle could be brought into view by instilling water into the lower conjunctival cul-de-sac and pulling the lids away from the globe. In the same year Professor Salzmann[3] used Fick's keratoconus contact glass and later designed a glass of his own in which he filled the space between the cornea and the glass with saline.

Koeppe[4] in 1920 devised his contact glass for use with the slitlamp and binocular microscope, in front of which the patient was seated. A special mirror permitted observation of the temporal and nasal sides of the chamber angle. Werner[5] and Castroviejo[6] likewise used the slitlamp for gonioscopy.

In 1925[7] Troncoso introduced gonioscopy into the English-language literature. He suggested the new C glass to Koeppe and designed the gonioscope, a monocular hand microscope with a nearly coaxial light source. His observations on the chamber angle are the basis for much of our present knowledge of this subject. Together with Castroviejo he[8] made important contributions to our knowledge of the comparative anatomy of the angle.

Thorburn[9] in 1927 made gonioscopic studies in cases of primary glaucoma, using a loupe and flashlight for his examination. He found the angle open in the majority of 100 cases.

Bruce[10] in 1933 used a binocular microscope held in his hands to localize foreign bodies in the anterior chamber.

Barkan[11] in 1936 started a new period of interest in the chamber angle. In addition to important contributions on the etiology of glaucoma, he introduced the microgonioscope and new surgical procedures for the treatment of glaucoma

* From the Glaucoma Clinic of the Illinois Eye and Ear Infirmary, Chicago, Dr. Harry S. Gradle, Director. Under a grant from the John and Mary R. Markle Foundation.

based on his observations of the chamber angle.

Technique of gonioscopy

Gonioscopy is made possible optically by eliminating the anterior corneal refracting surface with a contact glass. With the introduction of a fluid of proper transparency and index of refraction, the surface of the contact glass is optically substituted for the anterior corneal surface.

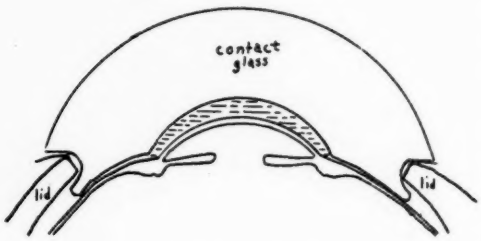

Fig. 1 (Sugar). Schematic diagram showing contact glass held in place by upper and lower lids.

Most observations of the chamber angle have been made with the patient in the recumbent position. After anesthesia with a drop or two of 0.5-percent pontocaine solution, the lower lip of the contact glass is inserted under the edge of the lower lid. The patient is asked to look down and the upper lid is pulled over the upper lip of the glass (see fig. 1). The patient's head is now turned to the side opposite the eye being observed and the temporal edge of the glass lifted slightly. A buffer solution with a *p*H of 7.3* is introduced with a lacrimal syringe or dropper to fill the space between the glass and the cornea. Slight pressure on the glass is then made, and the patient's head returned to its original position. The buffer solution was found to cause less corneal clouding than did saline or distilled water, the fluids ordinarily used with the contact glass.

Observation is made with the binocular microscope on the Barkan or the McLean[12] stand. The magnification most frequently used is approximately 10 to 11 diameters. Since the contact glass itself magnifies the region of the chamber angle approximately 1.3 times, the effective magnification is 13 to 14 diameters. With changes in the microscope oculars and objectives, the magnification can be increased to 40 diameters. The Barkan lamp, attached directly to the microscope, is a very satisfactory source of illumination. Perhaps the best illumination, but more expensive, is of a more coaxial type, such as is used by Castroviejo,[13] or that used by McLean.

Several new gonioscope stands have been recently introduced. Borgart[14] uses an apparatus made from a Leitz photographic copy stand, and Gradle uses a balanced wall-bracket of the type used to support dental X-ray machines.

Goldmann[15] in 1938, in order to use the slitlamp to observe the entire chamber angle without moving the patient, devised a flat-surfaced contact glass containing a fixed mirror. The entire glass is rotated to observe the angle in all meridia.

Clinical picture of the normal chamber angle

To appreciate the gonioscopic appearance of the anterior-chamber angle, one must first study the developmental processes which give rise to what we consider the normal angle and then follow

---

*Made up as follows, according to the formula of Dr. Sanford R. Gifford:

Solution 1:	
Boric acid crystals	12.4 gm.
Reagent potassium chloride	7.4 gm.
Distilled water	1000 c.c.
Solution 2:	
Anhydrous reagent sodium carbonate	21.2 gm.
Distilled water	1000 c.c.

To each 30 c.c. of solution no. 1 add 1.125 c.c. of solution no. 2 to give *p*H of 7.3.

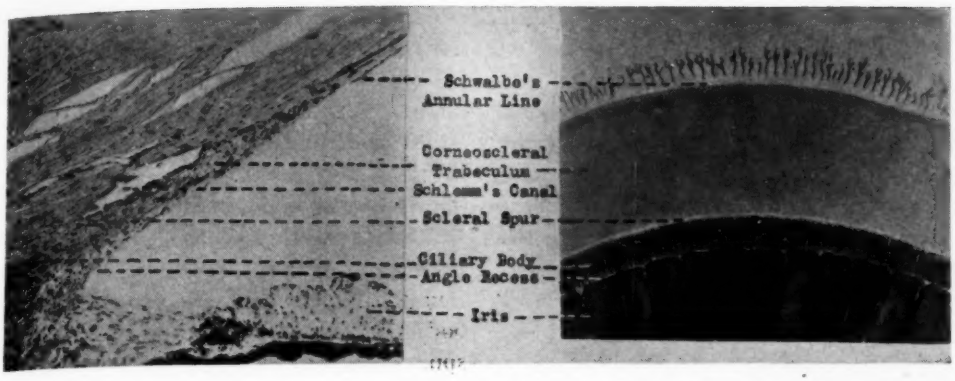

Fig. 2 (Sugar). Comparison of the histologic and gonioscopic pictures of the chamber angle in the normal blue- or gray-eyed individual without senile pigment changes.

the appearance of the angle during adult life to senility.

The angle of the human and primate eye is essentially different from that of lower animals. This difference can readily be appreciated from the beautiful illustrations in the work on this subject by Troncoso and Castroviejo.[8] In embryonic life, the space which later corresponds to the angle is filled by a mesodermal reticulum, part of which later develops into the iris stroma. Most of the remaining mesodermal tissue retrogresses, leaving an open angle lined with the structure known as the "meshwork of the angle of the anterior chamber." The meshwork is divided into two portions, scleral and uveal. In the adult eye, the major portion is scleral and is known as the *corneoscleral trabeculum*. The uveal portion is represented by the delicate trabeculae which cover the inner surface of the angle recess and also the thicker bands known as iris processes. The latter probably correspond to the ligamentum pectinatum of lower animals, which, having lost their function of lens support, have become rudimentary.

The processes of development and atrophy may be interrupted at any stage and give rise to congenital types of glaucoma. In a case of this type in the author's present series, the angle was filled with a trabecular meshwork continuous with the iris, completely obscuring the ordinary trabecular landmarks.

In the normal young adult human eye, the gonioscopic picture is rather characteristic, depending to some extent upon the color of the iris and ciliary body (figs. 2 and 3). From the iris plane toward the limbus, we first see an abrupt transition to the lateral wall of the angle.

Fig. 3 (Sugar). The gonioscopic picture of the angle in a brown-eyed individual with senile deposits of fine pigment in Schlemm's zone and on Schwalbe's line. A, branches of anterior ciliary vessels; B, Schwalbe's line; C, trabeculum; D, pigment in Schlemm's zone; E, scleral spur; F, ciliary body with vertical iris processes; G, iris.

The iris meets the latter at an angle of about 35 degrees.

The recess of the angle, usually obscured by the last roll of the iris, is bow-shaped and formed by the most anterior portion of the ciliary body covered with the thin uveal portion of the angle meshwork. Ordinarily one is able to see the lateral wall of this recess as it sweeps anteriorly toward the scleral spur. In eyes

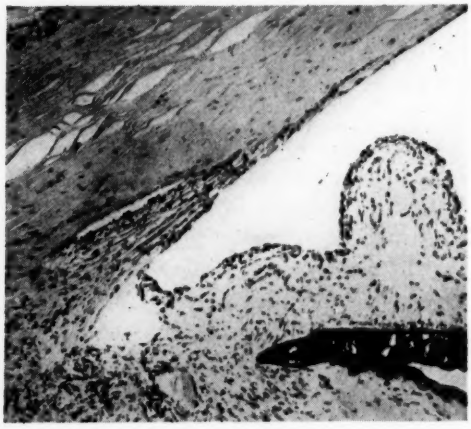

Fig. 4 (Sugar). Histologic picture of an iris process traversing the recess of the angle in a pigmented iris.

with blue irides, it consists of delicate grayish trabeculae on a faintly orange background of ciliary body. Fine irregularly coursing vessels are visible in the grayish tissue of the recess. Some are extensions of the radial iris vessels, while some appear to come from the depths of the recess under which the major arterial circle of the iris is found. In brown eyes the ciliary body and recess have a diffuse brown color against which the darker brown iris processes, when present, stand out.

In the myopic eye the iris is inserted relatively far back on the ciliary body so that a much wider ring of the latter is visible gonioscopically, especially in the higher degrees of myopia. Conversely, in highly hyperopic eyes, the visible ciliary-muscle band is narrower than in the normal emmetropic eye.

From the recess cornealward, the first landmark is the anterior border of the ciliary-body band which is inserted into the scleral spur (posterior annular line). The latter is sometimes seen as a thin white line because of its density, but its presence is usually inferred from its relation to the anterior edge of the ciliary body. (The appearance of the scleral spur has been exaggerated in the diagrams.)

From the ciliary body, the wall of the angle proceeds forward obliquely to the next landmark, the anterior border ring of Schwalbe. This ring appears as a glistening white line that varies considerably in thickness and breadth in different eyes as well as in different portions of the same eye. It frequently projects slightly into the anterior chamber and may rarely appear to bulge inward considerably in isolated areas of the same eye. Histologically, according to Salzmann, "it consists of a flat bundle of circularly fibrillated connective tissue supported by elastic fibers" lying between the apparent termination of Descemet's membrane and the beginning of the corneoscleral trabeculum. Gonioscopically, Schwalbe's line must be considered to include both the circular fibers and the inner surface of the translucent limbus, since they are optically undifferentiated.

Between the scleral spur and Schwalbe's ring lies the corneoscleral trabeculum proper. Beneath the latter, and just anterior to the scleral spur, lies the canal of Schlemm, so important to our present-day theories of glaucoma.

The iris processes (rudimentary ligamentum pectinatum of lower animals) are not always present and vary considerably in number and distribution when present (see fig. 4). They are gonioscopically of two types, the first corre-

sponding to meridional thickenings of the uveal meshwork lining the angle recess, and the second, to bands of iris tissue bridging the recess. The latter are sheathed by a thin layer of uveal-meshwork tissue. The processes end most frequently at the scleral spur but may extend as far as the cornea just anterior to Schwalbe's line. In many instances small trabeculated islands of this tissue may be seen on the trabeculum. In the Negro eye the first type of processes are always found and are usually short, dark brown, and quite numerous.

Just forward of the anterior ring of Schwalbe is seen a band of meridional blood vessels which appear through the transparent edge of the posterior layers of the cornea. These vessels, which were seen by Koeppe, are the last scleral branches of the rami recurrentes anteriores of the anterior ciliary vessels. They are the vessels which give rise to deep corneal vascularization. Their extension into the cornea was followed by the author in several cases of interstitial keratitis.

Most anteriorly the inner concave dome of the cornea is easily recognized and ends in its yellowish optical section.

Barkan has pointed out that the chamber angle is always narrower in the upper portion and varies in depth throughout the circumference. This is found to be true not only clinically but in studying serial sections of otherwise normal human eyes removed for tumors in the posterior part of the globe. Through the kindness of Dr. Georgiana Dvorak-Theobald, the eyes used in her studies of the canal of Schlemm[16] were made available to the author. The distances from the end of Descemet's membrane to the anterior margin of Schlemm's canal, from the anterior to the posterior ends of the canal, and from the posterior end of the canal to the floor of the angle recess, were measured microscopically. The sections within the pupillary area, only, were used.

The results are tabulated as follows:

TABLE 1

MEASUREMENTS OF THE WIDTH OF THE CHAMBER-ANGLE WALL

	Eye 1	2	3	Average
End of Descemet's Membrane to Schlemm's Canal	.343 mm. (.222 –.444)	.377 mm. (.326 –.459)	.393 mm. (.207 –.503)	.371 mm.
Width of Canal	.318 mm. (.252 –.400)	.272 mm. (.207 –.385)	.256 mm. (.207 –.326)	.282 mm.
End of Canal to Recess	.062 mm. (0 –.178)	.125 mm. (.030 –.237)	.114 mm. (.030 –.222)	.100 mm.
Total Width of Angle Wall	.740 mm. (.610 –.910)	.791 mm. (.607 –.932)	.756 mm. (.577 –.918)	.762 mm.

From the foregoing, one can realize that the width of the entire angle wall is approximately 0.76 mm., and that the canal of Schlemm is about 0.32 mm. in width, maximally. These values for the width of the angle wall agree favorably with measurements made in the living eye with the contact glass and microscope.

The canal of Schlemm is sometimes made visible to gonioscopic examination by its occasional content of blood. It is then seen as a pink uniform line anterior to the scleral spur. Under the magnifica-

tions used, the smaller subdivisions of the canal are not visible. In the seven eyes in which the canal was seen by the author, the only reason that could be advanced for the presence of blood was pressure of the contact glass against the venous drainage channels from the canal. In one of these otherwise normal eyes the canal was visible on three of four examinations. Attempts to influence its visibility by having the patient inhale deeply and also exhale deeply against a closed glottis to produce changes in venous pressure, were unsuccessful.

As middle age is approached, many normal eyes show deposits of pigment deep in the corneoscleral trabeculum as a brownish ring, corresponding actually to the area over Schlemm's canal. Superficial pigment deposits are present also in the remaining area of the trabeculum and on the anterior ring of Schwalbe. The pigment granules on the latter are particularly present in the lower part of the angle, probably due simply to gravitational factors. The trabecular pigment has no relation to the color of skin or iris. The only and obvious source of the pigment is the epithelium of the posterior iris surface. Its presence in the trabeculum is usually associated with disintegration of the pupil border pigment and fine deposits on the anterior iris surface.

Aside from the fact that gonioscopy makes possible clinical examination of a hitherto practically unexplored and invisible area in the normal living eye, it has special value in certain pathologic conditions. Changes in the angle as a result of anomalies, neoplasms, cysts, inflammation, and trauma may be observed by this means. Among the anomalies which should give interesting gonioscopic pictures are hydrophthalmos, congenital megalocornea[17] (see fig. 5), congenital iris coloboma, and irideremia. In the latter two conditions, developmental disturbances in the iris root and ciliary body may also be observed. Tumors of the iris root and ciliary body may be diagnosed earlier in some cases if this method of examination is resorted to.

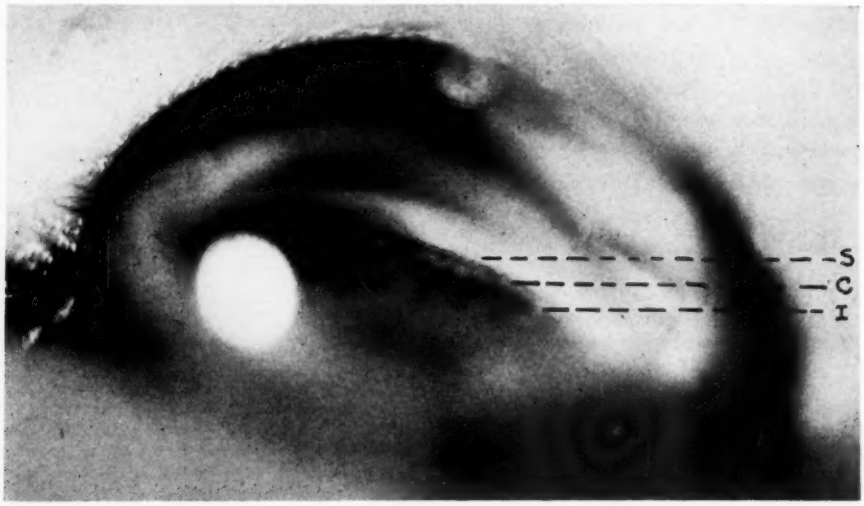

Fig. 5 (Sugar). Copy of a kodachrome photograph of the chamber angle in a case of megalocornea. Note that the pigmented tissue covering the ciliary body continues to the line of Schwalbe. The trabeculum is obscured. S, Schwalbe's line; C, ciliary body; I, iris root.

Synechia and remnants or organized exudates in the angle, as sequellae to chronic inflammatory disease, may be found. The effects of injuries to the anterior segment, involving the angle, may be studied. Similarly, small foreign bodies in the anterior chamber may be localized by direct observation.

Studies of the chamber angle should, of course, be made in all cases of glaucoma. It must be emphasized that gonioscopy, in itself, is not a diagnostic procedure, especially in primary glaucoma, but adds supplemental knowledge of the conditions present.

As a method of determining postoperative results, gonioscopy is enlightening. It is of particular value following cataract and glaucoma surgery. In the latter, it may give indications for the type of secondary operative procedure, in unsuccessful cases.

A new use for gonioscopy has been made by Dr. Harry S. Gradle and the author in obtaining clinical measurements of the depth of the chamber angle. This method employs measurements of the visible angle wall, using the gonioscopic contact glass and a graticule etched on one of the microscope oculars. The method may be used to make repeated observations on the angle depth in the same patient over a prolonged period. It may also be of aid in indicating cases to be watched as possibly preglaucomatous.

Gonioscopy in primary glaucoma

The gonioscopic picture in glaucoma has been considered to differ from the normal by the presence of peripheral anterior synechiae. These are recognized by obscuration of the landmarks of the angle and trabeculum by adhesions between the iris and the inner sclerolimbal wall. The synechiae may be partial or total, trabecular or scleral, depending on their extent. Knees (1876) and Weber (1877) discovered these adhesions in eyes enucleated after long-standing glaucoma and assumed their etiologic relationship to glaucoma. Since then Thorburn, Werner, Troncoso, and Barkan have shown that, instead of their being the cause of glaucoma, they are probably a relatively late result.

As a matter of fact, the presence of synechiae peripheral to the scleral spur should not reduce drainage from the anterior chamber through Schlemm's canal, if we assume that the proper functioning of the latter is essential to the maintenance of normal intraocular pressure.

It may be assumed that in acute and chronic incompensated glaucoma, associated probably with neurovascular crises, the angle is open, early. Later, as a result of the hyperemia and edema of the ciliary body and advance of the lens-iris diaphragm, synechiae may form if the attack is severe or persists sufficiently long. Troncoso advanced this theory, which has statistical substantiation.

Thorburn found synechiae in three of six congestive cases. Werner found them in all of three cases. In 23 of Troncoso's 34 cases synechiae were observed.

In a certain number of cases of incompensated, and in a few of compensated, glaucoma, the anterior chamber is too shallow for gonioscopic examination. By transilluminating the sclera behind the angle, it may be determined whether some of the less shallow chambers are open or closed. The author found 26 cases in which the angles were too shallow for accurate gonioscopic examination. Seventeen were of the incompensated and nine of the compensated type. In the large majority of cases of compensated glaucoma, the angles are open, without adhesions. Thorburn found open angles in 6 of 9 eyes; Werner in 20 of 28 eyes; and Troncoso in 19 of 34 eyes. Barkan found the angle open in about 60 percent

of his cases of compensated glaucoma. The author found the angle open in every one of 215 eyes with early or moderately advanced compensated glaucoma. In 16 eyes with far-advanced or absolute glaucoma, adhesions obliterated the angle in 10 and partly closed it in 6.

A prominent place in the etiology of compensated glaucoma has been attributed by Barkan to trabecular sclerosis

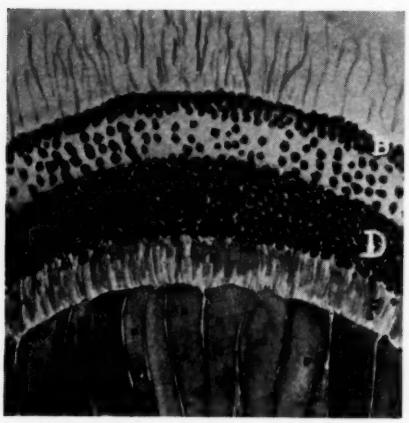

Fig. 6 (Sugar). Appearance of the angle in a 29-year-old glaucoma patient with unusual pigment deposit in Schlemm's zone (D). B, Schwalbe's line; F, ciliary body.

and to the presence of pigment granules in the spaces of the corneoscleral trabeculum. Koeppe[18] in 1916 was the first to consider the latter as a possible factor in causing glaucoma. The author has been unable to recognize sclerosis gonioscopically. Pigment, however, was present in 4 of 10 eyes with incompensated glaucoma and in 100 of 199 eyes with compensated glaucoma in which the presence or absence of pigment was sought for. Since pigment is found in the trabeculum as a result of senile pigment migration and degeneration in many nonglaucomatous eyes, it is debatable whether the pigment causes glaucoma by blocking the trabecular spaces, whether the pigment results from pigment epithelial degeneration as a result of the glaucomatous process, or whether it is just coincidental in patients of the age group considered. In a 29-year-old patient with compensated glaucoma, the pigment deposit was so heavy that it certainly suggested itself as the etiologic agent (fig. 6). In contradistinction to the cases in which there is trabecular pigment must be cited those eyes with capsular exfoliation without glaucoma in which more dense pigment deposits were present than in any of the cases of compensated glaucoma (other than the one just mentioned). It must be concluded, unfortunately, that no indication may be derived from the gonioscopic appearance in open-angle cases as to the functional efficiency of the trabecular spaces or Schlemm's canal.

It is interesting to note the picture of the chamber angle in two types of secondary glaucoma: Glaucoma capsulare and glaucoma following cataract extraction. In 35 cases of glaucoma capsulare (to be reported by Dr. Harry S. Gradle and the author), the angle was found to be open in every case preoperatively. All showed a trabecular pigment ring. Many showed capsular shreds deposited in the angle, as was first pointed out by Barkan. In this group of cases the pigment ring is unquestionably the result of rubbing off of the pigment epithelium of the iris. Gonioscopic examination in unilateral cases has shown that there may be no trabecular pigment in the unaffected eye, while it is always present in the eye with glaucoma capsulare or capsular exfoliation.

In 30 eyes with secondary glaucoma following cataract extraction, the angle in 29 was completely obliterated. In one, a small portion of the angle was open, and the tension became normal with miotics. In this series, no cases were included in which there had occurred post-

operative uveitis or hemorrhage. Many of the histories indicated a prolonged postoperative period during which the chamber was collapsed, associated in some instances with recognized choroidal detachment or iris prolapse. Complete obliteration of the angle is probably the cause of this type of glaucoma. Perhaps the angulation of the iris root at the point of adhesion is a contributing factor. The adhesions are usually too dense to be torn by miotics, and surgery is usually resorted to. In 11 cases of the author's series, cyclodialysis was successful in relieving the hypertension. In all of the latter a patent cyclodialysis cleft was visible gonioscopically.

One of the more valuable uses of gonioscopy in glaucoma is in a follow-up observation of the angle after surgery for glaucoma, particularly to determine the causes of failure. Sixty eyes were observed by the author both pre- and postoperatively. One hundred and forty-three others were examined only postoperatively. The cases will be discussed according to the surgical procedure used.

1. *Iridectomy:* This operation was performed in 19 eyes with incompensated glaucoma, in 4 with compensated glaucoma, and in 7 with absolute glaucoma with signs of vascular decompensation. In all of the latter two groups, the operation was unsuccessful in relieving the ocular hypertension. Of the 19 eyes with incompensated glaucoma, 13 were successfully operated upon and 6 unsuccessfully. In all of the successful cases the operation was performed early in the course of an acute attack or just after recovery from one; the operation in all of the unsuccessful cases occurred after sufficient time had elapsed for peripheral anterior synechiae to form. Not one of the eyes with acute incompensated glaucoma could be examined gonioscopically before surgery because of the corneal edema, but 15 of this group were studied postoperatively. The angle was obliterated by adhesions in six successful cases and in one unsuccessful one, and partly open in seven successful and one unsuccessful one.

Troncoso,[19] in discussing iridectomy, considered that reopening of the angle is not necessary for success, even when the angle is totally closed. The principal action of the operation, he believed, is reëstablishment of free communication between the anterior and posterior segments of the eye. The findings in the small group considered by the author seem to agree with these statements. Perhaps small openings present in the adhesions but not gonioscopically visible can account for the success of this operation in spite of total obliteration of the angle. One must remember that in the etiology of this type of glaucoma there are dynamic factors which are as yet not completely understood.

2. *Cyclodialysis:* The successful functional results of this operation have been well shown by Elschnig[20] histologically and by Barkan[21] gonioscopically. The former presented a report in 1932 of studies of an eye on which a successful cyclodialysis had been performed 14 years previously. He found a patent communication between the anterior chamber and the suprachoroidal space in the area of operation. In 1936 Barkan reported upon 14 cases of primary glaucoma in which cyclodialysis had been performed. In each of 11 successful cases, a cleft was found between the iris root and scleral wall. In the three unsuccessful cases, reattachment of the iris root to the scleral wall had taken place. In one of the latter, a second cyclodialysis was successful, with formation of a patent supraciliary cleft.

In the author's series of cases observed gonioscopically, cyclodialysis was per-

formed 33 times for compensated glaucoma. Twenty were successful and 13 unsuccessful. Of the 20 successful cases, 18 had a patent opening between the anterior chamber and the supraciliary space. In all except one of these the tonometric tension remained below 18 mm. Hg (Schiötz) without medication. In one, in which a very small cyclodialysis opening persisted, the tension remained normal with miotics. Two others were successful but could not be observed gonioscopically because of very shallow chambers (see fig. 7).

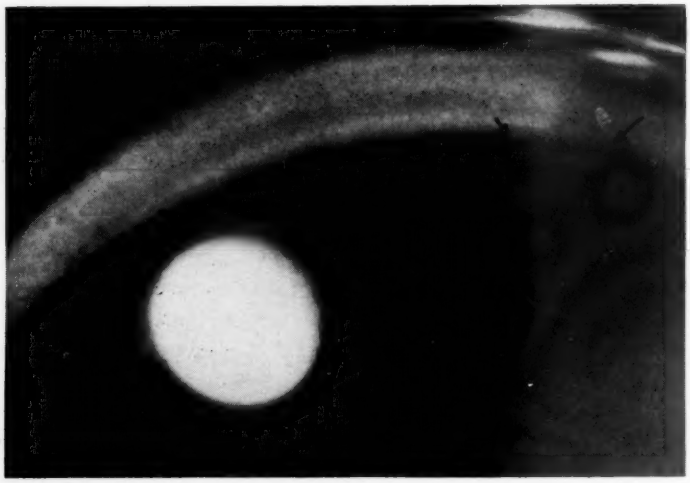

Fig. 7 (Sugar). Copy of a kodachrome photograph of an open cyclodialysis cleft (shown between arrows). Note the trabecular adhesions on each side of cleft.

Of the 13 unsuccessful cyclodialyses, none showed open clefts. Adhesions could be seen in the area of operation. In one case the process of postoperative closure of a cyclodialysis was followed gonioscopically. A blood clot was seen filling an open cyclodialysis, at first. Later, as the blood became organized, the iris root was drawn toward the scleral wall and the cleft closed. This occurrence was forecast theoretically and clinically by Dr. Gradle who, for the past four or five years, has been performing the cyclodialysis operation in the upper outer quadrant of the eyeball. The patient is then put to bed in an upright position and kept there until all blood in the anterior chamber has been absorbed. Thus the danger of closure of the path to the suprachoroidea by the organization of an occluding blood clot is eliminated.

Three unsuccessful cyclodialyses were repeated, with successful cleft formation in two.

No relation was found to exist between success or failure of this operation and the depth of the anterior chamber, provided no evidences of incompensation were present. Such eyes with shallow chambers obtained successful results equal to those with chambers of normal depth.

3. Of the *fistulizing operations* only the Elliot-trephining and the iris-inclusion operations will be considered. Troncoso and Reese[22] reported on the gonioscopic findings in 29 cases in which trephining had been done. They found adhesions to the sclera in 7, incarceration of ciliary processes in 12, and exudates attached to the ciliary body and sclera in 6. Seven had consecutive iritis and three showed normal healing. McLean,[23] at the Wilmer Institute, studied the chamber angle both

pre- and postoperatively in 10 cases in which trephining had been done. Of seven cases in which the angle was entirely open preoperatively, patency persisted in three after the operation. All three were completely successful. In the remaining four a few peripheral anterior synechiae were found postoperatively. Two patients had a completely successful result and two required the use of occasional miotics for complete control.

In the author's series, 102 trephined eyes were examined gonioscopically, 37 of them both pre- and postoperatively. The results are tabulated in chart 2. Of 30 eyes with open angles preoperatively, 15 had entirely successful results in spite of complete obliteration of the angle by adhesions. Of 11 other successful cases, the angle in 10 remained partly open and in only one completely open.

Of 11 unsuccessful trephining operations in the entire group of 102 eyes, the cause of failure could be found gonioscopically in 5. In four of these the trephine apertures were filled with plugs of iris or ciliary body. In the fifth, the trephine hole was plugged by a knuckle of lens substance. In two other eyes the trephine openings could not be seen, probably because they had been made too far behind the iris root. In one other eye the trephining had been made in the temporal horizontal meridian. Since the limbal lip is narrower at this area, the opening was seen to have been made behind the iris

CHART 2

RESULTS OF GONIOSCOPIC EXAMINATION OF PATIENTS ON WHOM FISTULIZING OPERATIONS WERE PERFORMED

	Successful				Unsuccessful			
	Angle Open	Partly Open	Angle Closed	Remarks	Angle Open	Partly Open	Angle Closed	Remarks
Trephining								
37 eyes examined pre- and postoperatively								
30 open preoperat.	1	10	15		0	1	3	2 filled with ciliary processes
3 partly open	0	2	0		0	0	1	filled with ciliary processes
4 closed	0	0	3		0	0	1	
102 eyes examined postoperatively	9 (2 with miotics)	27 (4 with miotics)	55 (6 with miotics)	1 partly filled with lens, 2 partly filled with iris or ciliary processes	0	1	10	4 filled with iris or ciliary processes. 1 with lens
Iris Inclusion								
11 eyes examined pre- and postoperatively								
7 open preoperat.	3 (1 with miotics)	0	2		0	2	0	
3 partly open	0	3	0		0	0	0	
1 closed	0	0	0		0	0	1	
39 eyes examined postoperatively	11 (3 with miotics)	15 (3 with miotics)	6 (1 with miotics)		0	3	4	

base and was filled with ciliary processes.

Twelve trephined eyes required miotics to keep the tension normal. Of these, three showed partial plugging of the trephine opening—by a knuckle of lens in one, and by iris in two. Two others showed open trephinings which were covered by sclerotic nonfiltering conjunctiva

Success with the trephine operation does not appear to depend so much on the adhesions as on the patency and functioning of the newly made drainage channels. Adhesions, however, become important if the trephine hole is plugged, the tension often rising higher in these instances than before operation.

The only published reports on gonioscopic examination following iridencleisis are those of Werner.[5] He found peripheral anterior synechiae in all cases. In 10 eyes with compensated glaucoma in which the angle had been free preoperatively, he found that 6 were entirely closed. In three other eyes with trabecular adhesions preoperatively, one remained unchanged after surgery and became obliterated in two. McLean[23] studied gonioscopically the eyes in 44 cases in which iridencleisis had been performed. In 37 the angle was entirely open preoperatively. Sixteen of them, all entirely successful, showed no synechiae postoperatively. Thirteen had a few synechiae postoperatively. Seven of the 13 were entirely successful and 6 required miotics at some time postoperatively. The remaining eight eyes had extensive postoperative synechiae. Four of them failed to obtain relief and four were successfully treated with miotics. Of seven cases with preoperative synechiae, results were completely successful in three, in three they were successful with miotics, and in one there was failure. In the latter the synechiae were increased extensively by the operation.

In the author's series, 39 iridencleisis and iridotasis cases were observed gonioscopically. Both pre- and postoperative gonioscopic examinations were made in only 11 eyes, in 7 of which the angles were entirely open before operation. Five of the latter were entirely successful. The angle remained open except for the area of iris incarceration in two, and was completely obliterated in two. One required miotics to keep the tension normal.

Of the entire group of 39 eyes, the angle remained open except for the area of iris inclusion in 11, partly open in 15, and obliterated in 6 cases, all successful. Miotics were necessary for normalization of tension in seven. In three eyes the operation was unsuccessful, although the angle remained partly open postoperatively. The result in the entire series may be obtained from chart 2.

The relation in the operations between failure and success seems here not to depend on the formation of angle adhesions but on the close approximation of the scleral lips at the site of incision. If too tightly incarcerated, the iris may not have an opportunity to act as a filtering wick. Perhaps removal of a small portion of scleral lip with the Herbert punch, at the time of operation, might remedy this.

In all these surgical procedures for glaucoma, it must be concluded that postoperative adhesions add embarrassment to the normal drainage channels. If the drainage through the newly formed channel is adequate, the operation is successful. If not, the hypertension becomes more difficult to control medically than before surgery, and subsequent surgery must consider the new anatomical configuration of the angle. McLean suggests the deliberate introduction of saline or air, preferably the latter, into the anterior chamber at the conclusion of the filtering operation to prevent formation of adhesions.

An interesting sidelight on the prevention of peripheral anterior synechiae is the fact that of 43 eyes, operated on for glaucoma capsulare, the angle remained completely open or nearly so in all but one. The exfoliated capsular material that is known to lie on the tissues of the angle is probably responsible for the relative absence of adhesions in these cases.

4. *Goniotomy:* Only the operative results in a small series of eyes operated on by Dr. S. J. Meyer and the author will be discussed to point out a possible significant gonioscopic finding. Nine patients were operated upon, using Barkan's[24] methods and instruments. In six of these the operation was modified so that the trabeculum was curetted rather than incised. This latter group consisted entirely of patients with glaucoma capsulare. In all instances the tension remained normal for a period ranging from three days to four months, but returned to its previous level in every instance. In two cases the tension remained normal for two and four months, respectively. No explanation could be made for the period of normal tension until it was observed that in the one case in which the tension had remained below 18 mm. Hg (Schiötz) for four months, the curettage had removed a portion of the trabeculum and scleral spur in one small area. This apparently had allowed fluid from the anterior chamber to enter the potential space behind the ciliary body and to act like a cyclodialysis. When the endothelial barrier, which had been removed by curettage, regenerated, the tension returned to its previous value. This suggested that perhaps in the other cases the incision or curettage had similarly removed or damaged a small portion of the endothelial water-barrier in the area of the angle and allowed the aqueous to infiltrate the ciliary body and retrociliary space. This observation is reported only as a possible link in the incomplete chain of evidence as to the functional changes resulting from surgery of the angle of the anterior chamber.

Conclusions

1. The normal angle of the anterior chamber has definitely recognizable characteristics, depending to some extent on the color of the iris. When trebecular pigment is present, its source is always the pigment epithelium of the iris. Its relation to glaucoma is still an unclarified point.

2. Gonioscopy is an important adjunct to thorough ophthalmic examination. It is of particular value in studying anomalies, neoplasms, cysts, and the results of trauma involving the angle. Perhaps most important is its use in studying postoperative glaucoma, particularly in determining the reasons for surgical failure.

3. Peripheral anterior synechiae are present in a large percentage of eyes operated upon to relieve glaucoma. These add to the embarrassment of previous drainage channels but are significant only when the new surgically formed channels are inadequate. They must be considered in contemplating secondary surgery.

4. Peripheral anterior synechiae are not present in early and even moderately advanced compensated cases of glaucoma which have never been incompensated at any time. They occur only late in the glaucomatous process, probably beginning with edema of the ciliary body during an episode of incompensation.

The author wishes to express his appreciation to Dr. Ben Williamson and Mr. John Ingram for their aid in the drawing and photography, respectively.

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HYPERURICEMIA AND INFLAMMATIONS OF THE EYE*

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The study of gout in relation to diseases of the eye has been undeservedly neglected for many years. Formerly, various ocular inflammations of obscure etiology and perplexing behavior were attributed to gout, and, as a result, "The modern reader is at first tempted to dismiss the conception of ophthalmic gout as a fable based on loose diagnosis, but such facile generalization is unjustified" (Savin[1]). Herrick and Tyson[2] emphasize the frequency of acute gout in private practice. Both Jennings[3] and Cohen[4] are almost certain that this disease has been diagnosed less often than it should have been.

Gout is a constitutional disease associated with the deposition of urates in various tissues of the body, most frequently in articular structures. Many vital aspects of the problem of the disease remain unexplained. At one time it was believed that the disease was always associated with hyperuricemia, but recently it has been found that, although the blood uric acid is usually raised, attacks are known to occur in the presence of a normal blood-uric-acid content (Herrick and Tyson,[2] Jennings,[3] Kersley[5]). On the other hand, Price[6] has found that an acute attack may fail to occur even though the blood-uric-acid concentration is extremely high.

Allbutt[7] states that urates are never deposited in healthy tissues. Chance[8] believes that symptoms of gout may result from the combined effects of faulty nitrogenous metabolism and infection. He believes that bacteria or their products from foci of infection may be disseminated throughout the body by way of the blood stream and become lodged in small vessels around the joints. The extent to which joints are then involved is determined by the grade of infection, virulence of the organism, degree of deficiency of nitrogenous metabolism, and the extent of generalized malnutrition of the individual. He also believes that the vessels at the root of the iris and limbus corneae present a situation similar to those around joints. Gifford,[9] on the other hand, states that inflammations associated with gout result from the metabolic disturbance itself without the presence of intercurrent infection.

McKay[10] believes that most cases of irregular gout such as the cutaneous, migrainous, ophthalmic, and nasal, and the cardiac and gastric syndromes sometimes ascribed to gout, may be the result of the combined effects of allergy and gout. Hypersensitivity explains, according to Kersley,[5] the provocative effects of various ingested foods, infections, emotional upsets, cold, and even trauma. The vasomotor phenomena of congestion and stasis, when associated with allergic attacks, predispose to the deposition of urates.

Price[6] calls attention to the disturbance of the balance of the body electrolytes occasioned by the diuresis which precedes the onset of gout. He believes that attacks of gout are due to the diuresis rather than to the raised level of the blood uric acid, and that the consequent disturbance of the electrolyte balance is of considerable importance in the causation of such attacks.

Recent case reports of ocular inflammations associated with gout are not nu-

* Read before the Sioux Valley Eye and Ear Academy at Sioux City, Iowa, January 17, 1940.

merous. Niyazi and Vefik[11] reported ocular crises resembling attacks of acute congestive glaucoma with demonstrable tophi. Wood[12] observed a marginal corneal ulcer combined with iritis and vitreous opacities in a woman aged 46 years; the blood uric acid was 4.1 mg. per 100 c.c. during an attack. Sanyal[13] found calcium urate excretions in the conjunctival sac of a 12-year-old girl who was afflicted with a faulty protein and calcium metabolism. Savin[1] observed an iridocyclitis in a woman aged 64 years who had a gouty toe; the blood uric acid was 7.15 mg. per 100 c.c.

The purpose of this report is to call attention to the effects on ocular inflammation by the reduction of high blood uric acid. Three cases are here reported in which the blood uric acid ranged from 4.1 to 5.6 mg. as against the normal of from 1 to 3 mg. per 100 c.c. None of the patients had proved gout since tophi were not demonstrated, but all had had rheumatic pains. Marginal corneal ulcers were present in two cases and a ruptured epithelial bulla was found in the third. This third patient had acquired an epithelial dystrophy following cataract extraction. Marked conjunctivitis similar to that described by Duke-Elder[14] was observed in two patients; all had mild iritis.

Report of cases

Case 1. E. C., a housewife, aged 56 years, was admitted to the Lutheran Hospital on August 25, 1939. She denied having a gouty family background and the use of alcoholic beverages; she indulged in eating between meals. The social history was irrelevant. Six months prior to admission the patient had spent several weeks at one of the hot springs in Arkansas for treatment of rheumatic pains. Four months later she developed a mild scaly irritation of the skin beneath the breasts and on one foot. Four weeks before admission the left eye became reddened and the patient complained of blurred vision, photophobia, and a gritty sensation but not much pain. She sought medical advice one week later.

The vision of the left eye was reduced to 6/9; the intraocular tension was 22 mm. of mercury (Schiötz). Bulbar injection was moderate and characterized by dilation of the conjunctival blood vessels; there was very little secretion. The cornea was hazy, and a shallow ulcer two millimeters in diameter was located near the limbus at the 6-o'clock position. There were also two grayish-white areas of infiltration of the corneal stroma, each one millimeter in diameter, elsewhere along the limbus. No crystals were seen in the infiltrations by biomicroscopy. There were no deposits on the posterior surface of the cornea and no posterior synechiae. Tyndall's phenomenon and a few floaters were present in the aqueous humor. Ophthalmoscopic examination revealed no pathology. Conjunctival cultures on blood agar grew Staphylococcus albus and Corynebacterium xerosis. The right eye was not affected. Examination by the patient's internist disclosed no focus of infection. She was 45 pounds overweight.

The patient at first refused hospitalization. She was treated with scopolamin hydrobromide 0.2 percent, silver nitrate ointment 0.5 percent, hot boric-acid compresses to the eye, and daily intramuscular injections of defatted milk. The bulbar injection increased rapidly; two additional grayish-white opacities appeared in the corneal stroma near the limbus, but the corneal ulcer remained unchanged. When the vision was reduced to 6/18, the patient entered the hospital. The intraocular tension was not increased. The urinalysis showed a trace of albumen. The red-cell count was

5,000,000, the hemoglobin 78 percent (Sahli), and the white-cell count 12,300. The blood sugar, urea nitrogen, uric acid, and creatinine were 155, 14, 4.8, and 1.5 mg. per 100 c.c., respectively.

A paracentesis was done and the anterior chamber emptied. The patient was given massive doses of vitamins A and B and a meat-free diet. The use of intramuscular injections of foreign protein was discontinued because the ocular inflammation had become markedly worse during its administration. Sixty grains of sodium salicylate were administered daily for three days and then discontinued because the patient became nauseated. The corneal ulcer was entirely healed on August 28th, but the bulbar injection and corneal haziness were only slightly improved; the blood uric acid had increased to 5.0 mg. When the patient was discharged from the hospital on September 2d, the bulbar injection was subsiding, and the cornea had cleared sufficiently to permit 6/9 vision; only one of the grayish-white infiltrations persisted. The blood uric acid was then 4.4 mg.

The eye was never entirely free of bulbar injection during September, yet the patient experienced no pain. In October she was finally persuaded to adhere to a low purin diet and to refrain from overeating. A complete recovery was made by November 5th. The cornea was clear except for a slight scar at the limbus at the 6-o'clock position; the grayish-white corneal infiltrations were absent. There were only a few deposits of fine pigment on the anterior surface of the lens and on the posterior surface of the cornea. The vision was 6/6; the blood uric acid was 3.6 mg. per 100 c.c. There has been no further attack.

Case 2. C. N., a spinster, aged 42 years, was admitted to the Lutheran Hospital on December 1, 1939. She denied having a gouty family history and the use of alcoholic beverages, but she always had had a good appetite and was given to overeating. She had had rheumatism of her feet for 15 years, but examination on several occasions failed to show tophi. A congenital cataract had been removed from the left eye in 1923 and from the right in 1931; the latter remained inflamed for several months after the operation. Further difficulty was not experienced until in January, 1939, at which time gradually increasing haziness of the right cornea appeared. There was no pain nor redness, but the visual acuity of the right eye decreased markedly during the following months. Two weeks prior to admission there was a hot, gritty sensation and moderate redness that persisted for three days. These symptoms subsided but recurred on November 29th. The patient then attempted to obtain relief by exposing the eye to the cold November wind, with the result that the condition was much worse on the following day. She visited the surgeon who had removed her cataracts and was advised to have the right eye enucleated. The left eye was not affected.

Vision of the right eye was reduced to counting fingers at 1 meter; that of the left was 6/6 corrected. The intraocular tension was 20 and 18 mm. of mercury (Schiötz) for the right and left eyes, respectively. The right globe was intensely injected; the cornea had the appearance of a ground glass. A recently ruptured epithelial bulla, three millimeters in diameter, was located in the pupillary area. The corneal changes elsewhere were limited almost entirely to the epithelium, which was so edematous that study of the underlying structures was very difficult. The pupil of the right eye measured 2.5; that of the left, 3.5 mm. in diameter. The iris was faintly seen; there were no

posterior synechiae. Ophthalmoscopic examination was impossible.

Conjunctival cultures on blood agar grew Corynebacterium xerosis. Examination by her internist revealed a chronic nephritis but no focus of infection; the patient was 30 pounds overweight. The blood sugar, urea nitrogen, and uric acid were 138, 18.9, and 5.6 mg. per 100 c.c., respectively. The red-cell count was 4,700,000, the hemoglobin 83 percent (Sahli), and the white-cell count 8600. The patient was placed on a low purin diet and given 15 grains of neocinchophen daily. Burbot liver oil was used locally in the right eye. On December 3d the denuded portion of the cornea had entirely healed and the bulbar injection and gritty sensation were rapidly subsiding; the blood uric acid was 4.2 mg. per 100 c.c. Practically all of the bulbar injection had subsided when the patient was discharged on December 5th; the blood uric acid was then 3.2 mg. The corneal dystrophy remained unchanged; the vision was 3/60 corrected. There has been no further attack.

Case 3. C. L., a white man, aged 70 years, was admitted to Lutheran Hospital on September 21, 1939. He had alalways enjoyed good health except for occasional rheumatic pains and denied having a gouty family background; he occasionally indulged in light wines and beer and was especially fond of meats. The social history was irrelevant. Three weeks prior to admission the patient was exposed to the elements on a windy day. The right eye became reddened and a gritty sensation was present. He sought advice from a physician primarily to have a foreign body removed from the eye. The physician, however, was unable to find any foreign body. During the next three weeks the condition remained practically unchanged, although the patient was receiving local treatment and intramuscular injections of foreign protein. The left eye was free from symptoms.

The vision of the right eye was 6/9 corrected; the intraocular tension was not increased. There was mild but deep circumcorneal scleral injection; the palpebral conjunctiva was slightly hyperemic. A shallow corneal ulcer two millimeters in diameter was located two millimeters from the corneal limbus at the 8-o'clock position; its margins were not undermined. A band of scarring one-half millimeter in width surrounded the ulcer; the remainder of the cornea was clear. There were no deposits on the posterior surface of the cornea, but a few floaters were observed in the anterior chamber. Further examination of the eye revealed no other pathology. Conjunctival cultures on blood agar grew Staphylococcus albus.

The blood sugar, urea nitrogen, and uric acid were 104, 15.4, and 4.1 mg. per 100 c.c. Urinalysis showed only an occasional hyalin cast. The red-cell count was 4,100,000, hemoglobin 75 percent (Sahli), and the white-cell count was 11,900. The patient was given massive doses of vitamins A and B and a low purin diet. Ninety grains of sodium salicylate were given by retention enema daily. Hot boric-acid compresses, silver-nitrate ointment 0.5 percent, scopolamin hydrobromide 0.2 percent, and burbot liver oil were used in the right eye. No further use of intramuscular foreign protein was attempted.

On September 23d the ulcer measured approximately one-half millimeter in diameter; it was entirely healed on the following day. The blood uric acid was 3.5 mg. per 100 c.c. on September 25th, the day of discharge from the hospital. Since then this man has followed his diet haphazardly but he has had no further difficulty.

Comment

The presence of a high blood-uric-acid concentration cannot be accepted as proof of gout, since the presence of tophi is required for positive diagnosis. Yet, until we have a better understanding of the nature of the disease, the presence of hyperuricemia must be regarded as at least suggestive of a potentially gouty patient. As long as the blood uric acid remains high, it appears that this source of supply may be drawn upon by that little-understood process which results in deposits in unsound tissues.

The three patients here reported could not be proved to have gout; nevertheless, they were regarded as at least potentially gouty until proper diet and the use of salicylates and neocinchophen had produced a nearly normal uric-acid concentration. In each of them the reduction of the blood uric acid to nearly normal levels was followed by a corresponding improvement of the ocular inflammation. In the first case, a proper diet resulted in a slow reduction and a slow recovery; in the second and third cases, neocinchophen and sodium salicylate, respectively, produced a rapid reduction with a rapid recovery. None of the three patients has had a relapse. The use of foreign protein in the third case was of no benefit; it seemed to have had a decidedly deleterious effect in the first case where its use was followed by marked congestion of the bulb and fresh grayish-white infiltrations at the limbus. These infiltrations may have been urates, but crystals like those reported by Wood[12] were not seen. The bulbar conjunctivitis was intense in the first and second cases, but only a low-grade iritis occurred.

It will be interesting to observe the course of the corneal epithelial dystrophy in the second case to determine the effects, if any, of the reduction of the high blood uric acid; it is fairly certain that the high concentration was present during the development of the dystrophy.

Summary

1. Multiple marginal corneal infiltrations, a single marginal corneal ulcer, marked bulbar conjunctivitis, and a mild iritis were observed in one woman whose blood uric acid was 4.8 mg. per 100 c.c.; violent bulbar conjunctivitis and mild iritis were observed in a second woman, who had a corneal epithelial dystrophy following the extraction of a congenital cataract, and a blood uric acid of 5.6 mg. per 100 c.c.; and a mild iritis was associated with a marginal ulcer in a man with a blood uric acid of 4.2 mg. per 100 c.c.

2. The high blood-uric-acid concentrations were reduced by low purin diets and treatment with sodium salicylate or neocinchophen.

3. Reduction of the blood uric acid was followed by improvement of the ocular inflammation in each case; the rate of recovery seemed to follow closely the rate of reduction of the blood uric acid.

4. The violence of the ocular inflammation was greatest in the individual with the highest and least in the individual with the lowest blood uric acid.

5. The use of foreign protein intramuscularly in two cases was accompanied by no improvement in one and an exacerbation of the existing inflammation in the other.

Conclusion

The infrequency with which gout is being associated with ocular inflammations is misleading. This disease, especially in private practice, could be identified more often if it were looked for more carefully.

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HISTORIC NOTES ON OPHTHALMOSCOPY*

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The operation for cataract has a history covering thousands of years, yet more has been learned regarding it in the last hundred years than in all the centuries that have gone before. One hundred years ago ophthalmology was called ophthalmic surgery. Exact observation of the eye, chiefly learned through the use of the ophthalmoscope, has increased our knowledge and power to combat blindness and defects of vision and has infinitely widened our conceptions of the relations of vision to healthy and efficient life.

"Helmholtz has opened for us a new world," said von Graefe, when he first viewed the fundus of the eye with the ophthalmoscope. But von Graefe's genius gave him only a glimpse of the promised land which his successors were to explore. Eduard von Jaeger gave his best years to the study of the things revealed by the ophthalmoscope, and by his "Pathologie des Auges" and his "Ophthalmoskopischer Hand-Atlas" taught them to the world. R. Liebreich, attempting to reproduce what he saw with the ophthalmoscope, became a painter and lived in the Latin Quarter in Paris.

Among those who labored in this new domain of science and who cultivated it and made it fruitful were Allbutt, Hutchinson, and Hughlings Jackson. These all came from Yorkshire, England, and studied in the York School of Medicine and Surgery. In 1871 Thomas Clifford Allbutt, physician to the Leeds General Infirmary, and lecturer on the Practice of Medicine, published his book on "The use of the ophthalmoscope in diseases of the nervous system, and of the kidneys, and also in certain other general disorders." He had learned the value of the instrument from Dr. J. W. Ogle at St. George's Hospital. As a frontispiece for his book he used a colored illustration of a choked disc, painted by C. E. Fitzgerald from a case under the care of H. R. Swanzy. There was also included a plate depicting optic neuritis due to lead poisoning; this had been used by Hutchinson as an illustration in the Royal London Ophthalmic Hospital Reports. Allbutt had previously published articles and lectures on this subject, and had acknowledged the use of material placed at his disposal by Dr. Crichton-Browne of the West Riding, and Dr. Christie of the North Riding asylums. Three years earlier Allbutt had published articles on "Optic nerves and retinas of the insane," "Medical ophthalmoscopy," and lectures on "optic neuritis"; and in 1869 and 1870 papers appeared on "The ophthalmoscope in tubercular meningitis." His book was dedicated to John Hughlings Jackson, with the words: "It was about the same time, I think, that you in London and I in Leeds began to use the ophthalmoscope in the investigation of cerebral diseases."

Allbutt continued to practice and write papers on internal diseases, and became Regius Professor of Medicine in Cambridge University in 1892. When he took part in the Congress of Arts and Sciences at the Saint Louis World's Fair in 1904, his address was devoted to showing the bad effects of dividing the subjects of medicine and surgery. In the middle ages physicians took university degrees and lived in the thin air of academic learning and aristocratic patronage, whereas surgeons were apprentices, and learned by actual contact with the living body and

* Read before the American Ophthalmological Society, seventy-fifth annual meeting, at Hot Springs, Virginia, June 5 to 7, 1939.

with human needs that grew out of the exposure to dirt, accident, and starvation. We may well think of Daviel, the young army surgeon of that time. He fought the plague in Marseilles, and won promotion to the post of Surgeon Major. This gave him an opportunity to learn and demonstrate that removal of cataract from the eye is a better procedure than displacing it from behind the pupil. Allbutt never published a second edition of his work. In 1879 Gowers's "Medical ophthalmoscopy," well illustrated with original drawings by its author, was published. This showed an enormous extension of its subject. In 1893 Allbutt began work on "The system of medicine," by which he is most widely known in the medical profession.

John Hughlings Jackson had no university degree. He had first thought of studying and teaching philosophy. He finally decided to study medicine and the physiology and diseases of the nervous system. He came to London in 1859, and secured a service at the National Hospital for the Paralyzed and Epileptic, where he came in contact with the work of Brown-Séquard. In 1863 he reported in the Medical Times and Gazette some cases of epilepsy. His first case was attended with temporary loss of sight and subsequent colored vision. He had learned to use the ophthalmoscope, and in 1858 he was appointed clinical assistant at the Royal London Ophthalmic Hospital, under Alfred Poland. In 1862, when Jonathan Hutchinson was appointed a surgeon to the hospital, Jackson became his clinical assistant. Later, in the hospital reports, he began to publish cases of optic neuritis with diseases of the central nervous system. He studied and reported many cases of epilepsy and epileptiform convulsions, together with the subsequent palsies and mental disturbances that attended or followed these attacks.

Jackson also gave careful attention to the findings of experimental physiologists and brain surgeons: Hitzig, Ferrier, Sir Victor Horsley, W. W. Keen, and others, who had entered this field of surgery. His careful studies enabled him to solve many of the problems of cerebral localization, the relation of convulsive seizures, and the subsequent paralysis, and he taught the supreme importance of ophthalmoscopic evidences of brain disease. What he thought of the opportunities he had enjoyed was expressed in 1877, when he delivered the annual oration before the Medical Society of London. He said: "I think it the luckiest thing in my medical life that I began the scientific study of my profession in an ophthalmic hospital. . . . I do not think there is any class of men in our profession to whom the term specialist, in its bad sense, can be less justly applied than to ophthalmic surgeons; for it is plain enough that their department potentially includes the whole range of medicine and surgery. . . . Without an expansive knowledge of ophthalmology, a methodical investigation of diseases of the nervous system is impossible."

Jonathan Hutchinson was called "the greatest general practitioner in Europe" and "the universal specialist." How well he deserved these titles was recognized by his conservative British colleagues. He was a licentiate, and became a Fellow of the Royal College of Surgeons in 1862. He was professor of surgery and pathology of the college from 1877 to 1882. He was president of the Hunterian Society in 1869; of the Pathological Society in 1879; of the Ophthalmological Society of the United Kingdom in 1883; of the Neurological Society in 1887; of the Royal College of Surgeons in 1889; and of the Medical Society in 1890. From 1894 to 1896 he was president of the Royal Medical and Chirurgical Society;

and in 1909 he was knighted and became Sir Jonathan Hutchinson. Living at the time when, because of the rapid development of medical knowledge, medical specialization became inevitable, he gave attention to every phase of medical science that awakened his interest. In addition, he was so greatly interested in natural history that he established museums—at Selby, where he was born, and at Haslemere in Surrey, where he spent the last years of his life. He was the founder of the London Polyclinic for Graduate Instruction.

In 1857 the Royal London Ophthalmic Hospital Reports began to be published in the form of a quarterly journal. In the issue for July, 1858, Hutchinson contributed a series of articles on "Different forms of inflammation of the eye consequent on hereditary syphilis." He first discussed iritis and keratitis. These articles were continued through five volumes of the reports. The material thus accumulated supplied the bulk of Hutchinson's book on syphilis. "He was," said Treacher Collins, "a most patient and elaborate note-taker." As an explanation for his lengthy notes of some of his published cases he said: "I must plead that they are the stones out of which the edifice is to be built, and that unless care be devoted to their preparation in the first instance, it will be useless to expend it on the subsequent elaboration." His work, by revealing the obscure, previously unrecognized effects of syphilis, opened a new era in our knowledge of the disease.

In the reports for November, 1871, Hutchinson wrote "Statistical details of four years' experience in respect to the form of amaurosis supposed to be due to tobacco." The details of this article established the existence of tobacco amblyopia, and the importance of the group of toxic amblyopias. Not content with the cornerstones he furnished for the future construction of the edifice of medicine, for example, interstitial keratitis, Hutchinson teeth, macular amblyopia and color scotoma of toxic amblyopia, Hutchinson recorded long series of "Miscellaneous cases" which illustrated his exact methods of notation and the thoughtful consideration he gave to his observations. He pointed emphatically to the fact that ophthalmology is more than ophthalmic surgery, or the prescription of lenses, or the exercising, by costly machinery, of ocular movements. He established for all time the fact that ophthalmology is a branch of general medicine. In this newly expanding field much still remains to be observed and recorded that will lend exactness, stability, and beneficial accuracy to medical diagnosis.

We have dipped into history deeply enough to understand something of the development of modern medicine. Allbutt, Hughlings Jackson, and Jonathan Hutchinson studied in a school that taught both medicine and surgery. Allbutt learned that the ophthalmoscope belonged, together with the clinical thermometer and the hypodermic syringe, in the armamentarium of the physician. Jackson found that the eye, with its field of vision and movements, was a guide to the understanding of the anatomy, physiology, and diseases of the central nervous system. Hutchinson saw that the whole domain of surgery and medicine opened up before him. He saw what no man had previously seen, and he did what needed to be done. By his links of observation and his chains of thought he bound together the separate parts of surgery and medicine that needed to be united in order to create the new domain of modern medicine.

These men and their fellow workers have opened to us the new field of preventive medicine. It is our duty and our privilege to explore this field and labor

in it. Edward Loring said of the ophthalmoscope, which he helped to complete: "With it, is like walking into nature's laboratory and seeing the infinite in action. . . . By it we are enabled to look upon the only nerve in the body which can ever lie open to our inspection under physiologic conditions; and to follow in a transparent membrane an isolated circulation of blood from its entrance into the eye through the arteries to its exit in the vein. We are further enabled to watch daily, or even hourly, morbid processes in each and every phase. . . . Through this agency also we get the first intimations of disease in remote and seemingly unconnected organs."

It is for us to go forward and to use the opportunities that we now have in order to build the medicine of the future, and to lay the foundations for preventive medicine. Medicine, with its new methods of observation—physiology, pathology, biochemistry—together with all the helps that science can afford, will itself become the science of health.

As observers of new facts, ophthalmologists are situated most happily. Much of our daily work consists in comparing the condition of each patient with normal standards. Thus his vision, his refraction, his accommodation and convergence, his ocular movements, and his endurance of eye work are to be considered. The color of his optic disc and his fundus, the relative size and contour of his retinal vessels, are to be compared with the normal eyegrounds that we see daily. The physician who uses this method of diagnosis daily, keeping in mind his normal standards, will have a great advantage over the one who only occasionally compares a particular case with normal standards.

Now that every student of medicine is expected to have a knowledge of the ophthalmoscope and of what it reveals, the entire medical profession should be prepared to understand and value what has been, and is being, discovered by this method of examination. The family physician may learn by his own observation, and should certainly appreciate what he is told by his consultant. Thus is established a state of mutual understanding and respect that makes for efficiency. It should be emphasized that medicine is one great service; that all who take part in this service should know that the whole is greater than any or all of its parts.

Our predecessors and teachers met the changes of their day, and we are here to view our special problems in the light of common experience. We have the opportunity and it is our duty to study the part that ophthalmology is to play in the broader field of preventive medicine. We better than others understand the relations of eye health to general health, and the conditions and visual requirements of our time. We must learn the new demands that are made upon vision, the new services it has to render in this age of general reading and mechanical occupations. We must call attention to the eye symptoms of disease affecting other parts of the body.

Our opportunities and duties include the teaching of the general importance of what has been learned and its application to the practice of ophthalmology. We must demonstrate this importance to medical practice and the prevention of disease. We must publish and emphasize facts all workers in preventive medicine should know and utilize in every department of medical and surgical practice.

Republic Building

TRANSPLANTATION OF CORNEA BY MEANS OF A MECHANICALLY OBTAINED BEVELED-EDGE SEGMENT

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Ever since transplantation of cornea has been seriously considered by eye surgeons, they have sought a means of obtaining a graft with a beveled edge that might be obtained mechanically.

Several years ago we began experimenting with this end in view. The first idea was the use of a specially constructed trephine. We succeeded in this by using three tiny blades constructed with rounded, spadelike cutting edges, fitting into a cone-shaped tunnel, and the whole mounted on a tripod the feet of which rested on the corneal margin.

This worked very well theoretically and on stiff, resisting material such as leather. When it was tried on the cornea, the corneal elasticity prevented completion of the cutting of the segment and caused it to curl up and tear. This very elasticity, which led to failure with the trephine, is the specific property that makes possible the cutting of a beveled graft by means of a specially constructed punch.

An incision is made in the cornea at the upper corneal margin, large enough for the insertion of the punch blade. The punch is constructed so that the female blade is 6.5 mm. wide and 1.0 mm. thick. The upper surface of its bore measures 4.5 mm. in diameter. The under surface is wider, as the hole is cut on a bevel so as to make the upper cutting edge sharp.

Fig. 1 (Wiener and Alvis). Punch for cutting beveled graft.

The male blade is bullet nosed, its diameter 2.5 mm. from the tip, being the same as that of the hole in the female blade. When the sharp edge of the female blade, after being introduced into the anterior chamber, engages the under surface of the cornea, the tip of the male blade presses down, reverses the curvature and stretches the entire anterior corneal surface, driving a wider portion of it into the punch.

By the time the epithelium reaches the cutting edge of the female blade it is stretched over the bullet nose of the male blade to such an extent that the segment punched out has a beveled edge the epithelial surface of which is about 0.6 mm. wider than the endothelial surface. The graft is not injured either macroscopically or microscopically.

* From the Department of Ophthalmology of the Washington University School of Medicine. Presented before the American Academy of Ophthalmology and Otolaryngology in Chicago, October 9, 1939.

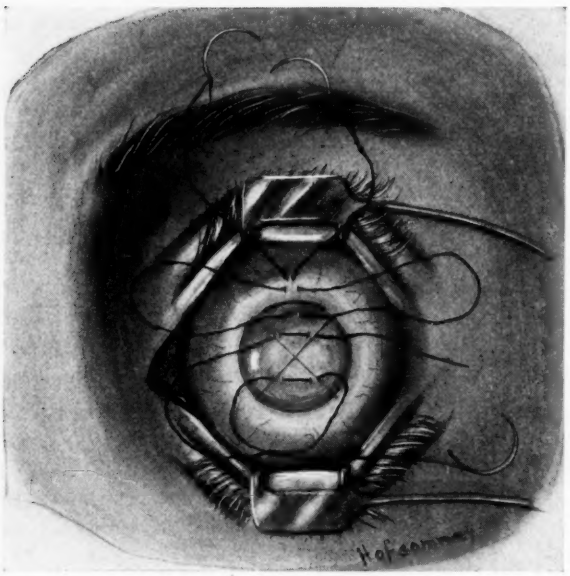

Fig. 2 (Wiener and Alvis).

The operation is carried out in the following manner:

Local anesthesia is induced by the use of 0.5 percent pontocaine instillations with retrobulbar injection of 2-percent novocaine. Akinesia of the lids is obtained by the O'Brien or Van Lint method. A small amount of 2 percent Suprarenin Jel is then introduced into the cul-de-sac. This is done for a two-fold purpose. It dilates the pupil *ad maximum* so that it will not contract when the chamber is emptied. Since we have done this we have had little difficulty with prolapse of the iris, either at the limbal incision or at the site of the punch opening.

The lids are separated. With a double-armed suture of the finest silk thread obtainable, armed with 10-mm. fully curved Kalt needles, a horizontal bite about 2 mm. wide is made in the cornea close to the upper limbus. Each needle then takes a small, but firm vertical bite in the conjunctiva-sclera close to the limbus opposite the exit of the threads in the cornea. The loops are pulled aside. We are now ready for the modified Thomas suture. The center of the cornea is marked. Two fine lines are cut on the cornea through its center with the tip of a sharp scalpel, at an angle of 45 degrees to the horizontal, making them perpendicular to one another. These are the markers for the stitch which is to hold the graft in place. They are made visible by instilling a drop of fluorescein and then washing out with sterile water or boric solution.

With the same suture material armed with a 10-mm. full-curved Kalt needle, a bite is taken in the cornea, superficially entering at a point on the line toward the upper temporal corneal margin, about three millimeters away

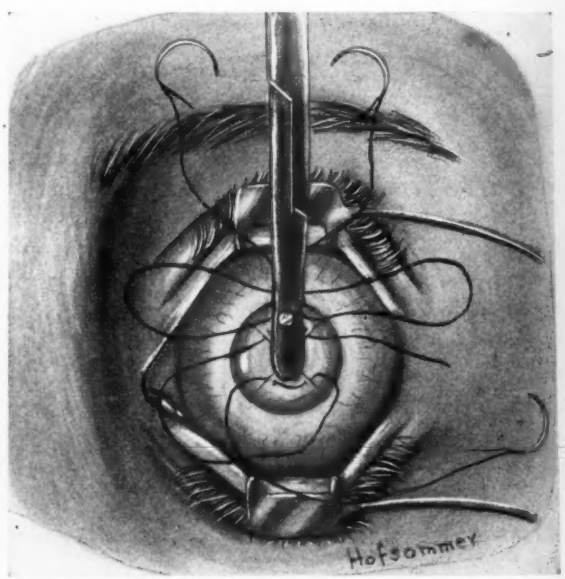

Fig. 3 (Wiener and Alvis).

from the margin. A second bite is taken opposite the first, emerging on the upper nasal line at a point corresponding to the entrance of the first bite on the opposite upper line. The needle then takes a small, superficial bite into the cornea near the lower temporal border at a point corresponding as nearly as possible to the first bite on the upper temporal line. The final bite enters the cornea below the entrance of the second bite, emerging on the lower nasal line also about three millimeters away from the corneal margin.

The advantage of having the lines is that when the threads emerge on the lines, regardless of whether they have been equally placed, the crossing point of the threads is bound to be over the center of the cornea, thus holding the graft in position evenly. The loop suture is now carefully laid aside (fig. 2).

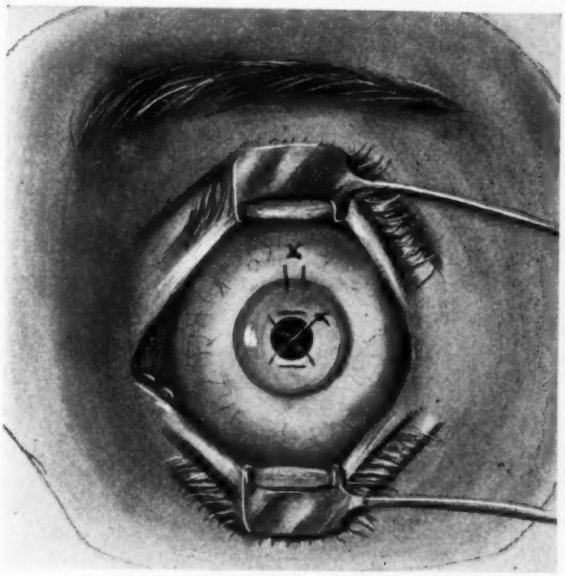

Fig. 5 (Wiener and Alvis).

With a short, narrow Graefe knife an incision is made in the cornea at the limbus, about eight millimeters long, between the loops of the first thread. The female blade of the punch is then introduced into the anterior chamber so that the middle will be opposite the center of the cornea. Holding it against the under surface of the cornea, the punch is slowly but firmly closed. The blades are then separated, and the female blade slowly withdrawn from the chamber, the while holding it close to the under surface of the cornea so that the excised portion will remain within the circle of the female blade. This is not so important in removing the first segment as it is in taking out the portion of the donor eye to be used as the graft (figs. 3, 4).

The upper suture is then tied, closing the limbal inci-

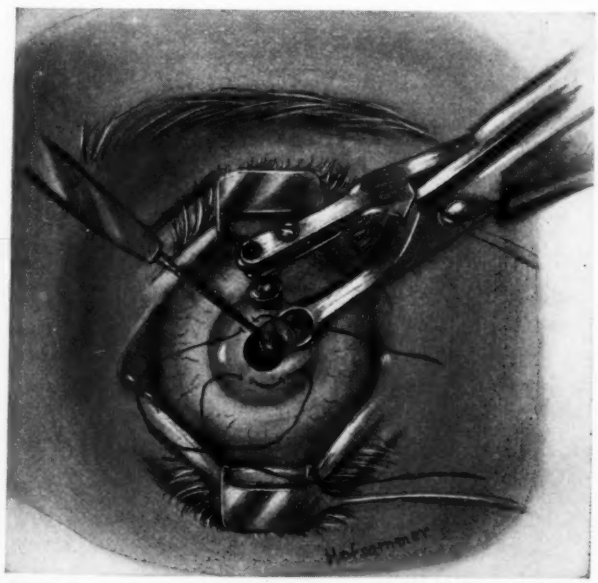

Fig. 4 (Wiener and Alvis).

sion. The host is now ready to receive the graft from the donor. The segment is obtained in the same manner, except that after the eye has been enucleated and placed in a normal salt solution awaiting its use, we merely make the incision with the Graefe knife, insert the punch blade and remove the segment. The

Fig. 6 (Wiener and Alvis).

graft is carried from the donor eye on the punch blade to the cornea of the host where it is carefully slid off with the point of the Graefe knife into its position, whereupon the corneal cross stitch is carefully tied. Care must be taken not to tie it too tight, since it tightens up considerably when the anterior chamber fills. If the stitch is snug on completion of the operation, it will be too tight later and press against the graft, distorting it and jeopardizing its vitality. The knot must not lie over the graft (fig. 5).

The lids are closed and sealed with a thin layer of cotton, first wet with sterile water, gently approximated to the skin of the lid and then dried with the warm air of a hair drier.

Where the cornea of the host is vascular, an erythema dose of X ray is given the following morning, and repeated a second or even a third time if the vascularity seems to want to encroach on the graft. Numerous animals were operated on before the technique, as now used, was perfected. The work was done in the laboratory of the Oscar Johnson Institute connected with Washington University School of Medicine. Through the courtesy of Captain Minter and Commander Brown of the Navy Hospital at Balboa Park, San Diego, the technique was further advanced.

Anesthesia in the rabbit is secured by means of intravenous injection of sodium barbital with a small amount of ether added.

The suprarenin helps in the operation on rabbits in other ways. Their aqueous is quite different from that of the human eye in that it rapidly coagulates, forming a thick, gummy mass over the wounds, interfering seriously with the facility of the technique. The secretion of aqueous is stopped by the suprarenin, which also checks bleeding in case the iris is cut.

The following case is reported and photograph shown, although we realize that enough time has not yet elapsed to predict the eventual final outcome.

Mrs. L. K., aged 33 years, housewife, first noticed poor vision at the age of 13 years. She came under the service of Dr. A. Ray Irvine at the Los Angeles County Hospital, and has been treated for syphilis for the last five years; Wassermann and Kahn tests remaining positive during all this time. She was referred to the Eye Department from the Luetic service as a matter of routine. An old, inactive interstitial keratitis was revealed in both eyes. There was a general uniform corneal haze, confined chiefly to the anterior layers of the cornea. Old collapsed vessels could be seen running through the stroma; a few vessels in the deep layers, through the center. The anterior chamber was slightly shallow, some definite ad-

hesions of the iris to the lens being made out. There was a good red reflex. Light perception and projection were good.

The left eye was similar to the right, except that the scarring was less extensive. Old, collapsed, superficial and deep vessels could be made out. There were some pigment spots on the lens. The fundus, seen hazily through the opaque media, revealed an apparently normal disc with an old area of chorioretinitis between the macula and the disc. Vision was 20/50. A corneal transplant was recommended, although the presence of deep vascularity made the prognosis none too favorable for the right eye. The operation was performed on August 11, 1939, by Dr. A. Ray Irvine. The donor was a middle-aged woman with sarcoma of the choroid, the anterior segment of her eye being found perfectly normal.

The graft seemed to have taken perfectly, the sutures being removed on the sixth day. Dr. Irvine reported that "the graft looked perfectly clear for several days after the operation, after which it became slightly hazy. When the patient left the hospital the graft was clearing. There were a few vessels in the cornea surrounding the graft, but none in the graft." Through some slip-up in the orders, the erythema dose of X ray, ordered the day following the operation, was not given until August 31st, by which time some vessels had grown into the transplant. These had been first noticed about 10 days before the X ray was used. A second erythema X-ray dose was given on September 20th. The last examination of the patient was made on this date when the following note was made by Dr. Rodman Irvine: "Vision 5/200. Slight photophobia. Eye is whitening, but still a slight amount of limbal injection persists. There is a slight, uniform haze of the transplant, with some deep striae and also some deep vessels can be seen growing into the periphery. On one side, a small strip of iris is seen incarcerated in the wound between the transplant and the cornea. At the site of the keratome incision of the cornea, there is a slight incarceration of the iris. The anterior chamber is quite shallow, being only about 1 mm. in depth. A good red reflex can be seen through the transplant, but no details of the fundus made out. The patient has had no discomfort and is quite happy with the result." The photograph herewith presented was taken through the courtesy of Dr. Irvine on September 11, 1939 (fig. 6).

The photograph of the first rabbit was taken September 12, 1939. The transplant was done on August 7th at the Navy Hospital in Balboa Park.

The rabbits now being shown were operated on at the Oscar Johnson Institute, August 31, 1939. Photographs were taken on October 3, 1939. These grafts so far show no vascularity.

The advantages are obvious. The segments are rapidly obtained; they are identical, and therefore fit exactly; the beveled edge prevents the graft from slipping into the chamber; the lens is protected so that it cannot be injured in the procedure; the stitching has been modified so that as soon as the segment has been removed from the host, the corneal wound made for the introduction of the punch is closed; a simplification of the Thomas stitch is offered. The segment is not injured, either macroscopically or microscopically by the action of the punch, nor in transferring it from donor to recipient eye.

Carleton Building.

THE PROJECTION METHOD OF PRESENTING THE TEST OBJECT FOR TESTING VISUAL ACUITY*

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A complication in the testing and rating of vision has been created in recent years by the introduction of the projection method of presenting the test object. It may not be out of place at this time to discuss this complication since the primary purpose in all our discussions of the testing and rating of vision has been to indicate as best we can proper standard conditions. The need for a discussion of the point is all the greater because of the recent rapid growth in the use of the projection method.

The projection method presents an easy means of standardizing the intensity of light on the test object and has certain other conveniences for the practicing refractionist. Also it offers a distinct and very great advantage in technique in the use of projectors which have special attachments and devices for the detection of errors in refraction and which cannot readily be used with the printed chart. But the unnatural ocular conditions imposed are not good for the testing and rating of vision. Some of these conditions are: a rapidly increasing dark adaptation through the test period, a wider pupil, a sharp brightness contrast of the test field with the dark surroundings (the spotlight effect) and a liability to inaccuracies in the focusing of the test object.

Dark adaptation. That dark adaptation exerts a profound effect on visual acuity is clearly attested by the fact that changes in the light minimum and in the light minimum for the discrimination of detail are the two methods that are used for measuring changes in dark adaptation. The adaptation here, however, is not to a continuously dark field, but to a dark field with a bright oblong at its center—the image of the test chart. Just what the effect of adaptation to a field of this type is has not, so far as we know, as yet been studied; but the condition is very unlike what is ordinarily encountered in customary types of work.

Breadth of pupil. That breadth of pupil exerts a powerful effect on the clear focusing of the image on the retina is well known. A decrease from the optimum size of pupil blurs the image because of a diffraction effect; an increase blurs it because of the increase in the size of the dispersion circles formed in the image even with the best focus that can be attained, due to the larger cone of light entering the eye through the wider pupil. We have found by test that, as might be expected, the effect is greatly exaggerated in case of errors of refraction, varying with the amount of the error. It is of course exaggerated also in case of the wide pupils produced by the use of a cycloplegic. Compensating to some extent for the inaccuracy in focusing produced by increasing the size of the pupil is the effect of the increased amount of light entering the eyes on the power of the retina to discriminate the detail in the image. For the emmetropic eyes we have tested we have found that the optimum size of pupil may be from 1.2 to 1.4 mm. when the amount of light entering the eye was made independent of size of pupil, that is, compensated for the change in the size of the pupil; and from 1.2 to 2.5 mm. when it was allowed to vary with the size of the pupil, depending upon the observer, the intensity of light used, the size of the illuminated area, the distance of

* From the Research Laboratory of Physiological Optics.

the object viewed, and so forth. Beyond the optimum size, a substantial decrease in acuity was found with increase in size of pupil, in some cases becoming more rapid as the larger sizes were approached. The range of illumination used in these experiments was 5 to 44 ft-c and of diameter of pupil, 0.4 to 5 mm. In case of errors of refraction the optimum size of pupil was 1.2 mm. when the amount of light entering the eye was made independent of size of pupil and, with one exception, again 1.2 mm. when it was allowed to vary with the size of the pupil. Beyond the optimum size, acuity fell off rapidly when the size of the pupil was increased, most rapidly just after the optimum size was exceeded.* We cannot, of course, say just what the width of the pupil is in the different test situations in which the projection method may be used. However, it may be safely said that vision should not be rated with an unnaturally large pupil.

It is to be clearly understood that we are discussing here the projection method in relation to its fitness for the testing and rating of vision, not to its fitness for the detection and correction of errors of refraction. In case of astigmatism, for example, the wider pupil present at low illumination enables one to pick up an astigmatism by the acuity method that could not be detected with a smaller pupil because of the focusing action of the smaller pupil. In this connection it may be noted that, contrary to what is sometimes thought, the correction of the actual astigmatism that is present in the refracting system, even though it is not manifest in the test with the small pupil, can do no possible harm even in the use of the eye with the small pupil, since it only produces an emmetropic condition. The astigmatism has not been overcorrected. A small pupil does not correct the inequality of focusing in case of an astigmatism; it simply masks it. In this respect the part it plays in vision is similar to the masking or compensating effect of increase of intensity of illumination in enabling the retina better to discriminate the detail in a blurred image. This negative reason, however, would not justify the correction. The real purpose of the correction is, of course, to eliminate any possibility of the blurring action of the astigmatism that may be present with any size of pupil and that may occur in different working conditions, and any possible harmful effect of an amount of astigmatism too small to be detected by the customary test procedure with a small pupil.

It might be argued that an increase in the size of the pupil may increase the effect of spherical aberration and that the uncorrectable blurring so produced would render any form of the visual-acuity test less sensitive for detecting astigmatism. Our answer to this would be the simple statement of fact that astigmatisms can be detected by the acuity method at the low which cannot be detected at the higher illuminations, and that the more accurate corrections made at low illumination improve vision even at the higher illuminations, as can be shown by carefully conducted visual-acuity tests, by the greater comfort in the use of the eye, and particularly by the sensitive tests of speed of discrimination and power to sustain clear seeing. This indicates that the effect of spherical aberration is not an important factor.

The factors that render the acuity test more sensitive at low than high illumination for the detection of an astigmatism are: (a) at low illumination the focusing action of the small pupil is not present to mask or conceal the astigmatism; and (b) low illumination gives the retina less

*These determinations were made under our direction by M. I. Smith.

power than high illumination to discriminate detail in the image, thus causing the blurring and distortion due to an astigmatism to have more effect on acuity. In this connection it cannot be emphasized too strongly that to conceal or compensate for an astigmatism is by no means to correct it and that in the eye we are dealing with a variable, not a fixed size of pupil. With a small pupil the refractive error is still present, ready to produce its disturbing effect under other pupil conditions and, perhaps, strain or other harm under the same pupil conditions. In testing for an astigmatism by the acuity method low illumination plays a role somewhat analogous to that played by fogging or a cycloplegic in revealing a latent hyperopia.

Brightness contrast of the test field with the dark surroundings. The sharp brightness contrast of the image of the test chart with the dark surrounding field is uncomfortable and fatiguing to the eye. Also the high brightness difference between the image and its dark surroundings induces over the test field a strong brightness, subjectively aroused, which increases the glare from this field and has the effect of an overlay of light. This overlay tends to blur the details in the image of the test objects and to change their brightness relation to their background, giving a relationship differing from that found in the printed chart which was reproduced to make the projector slide.

Inaccuracies in focusing. Inaccuracies in focusing produce two effects in the image. They blur the details and change the brightness relation of the test objects to their background; that is, gray the test objects. The result of both of these effects is to reduce the visibility of the test objects. The liability to inaccuracies in focusing has been reduced in recent years by the use of better lenses in projectors. In former times the lenses used rendered the projection method out of the question for vision testing. However, there is still a strong liability to error and variability due to lack of sufficient care in setting up and using the test equipment. In connection with this and the point just preceding it may be noted that when viewed from a distance of 20 feet the projected test objects may appear clear and black, but when inspected close at hand they are not seen as either clear or black. These defects are not present in case of a printed chart.

Obviously the unnatural ocular conditions imposed by the projection method are not fit, certainly not best for a standard testing and rating of vision and their contemporary use with the printed chart is a cause of confusion—just how much cannot be determined without a special study of the point.

Summary

The projection method of presenting the test object for testing visual acuity affords an easy means of standardizing the intensity of light on the test object and has certain other conveniences for the practicing refractionist. Also it offers a distinct and very great advantage in technique in case of those projectors having special attachments and devices for the detection of errors in refraction, which cannot readily be used with the printed chart. But the unnatural ocular conditions imposed are not good for the testing and rating of vision. Some of these conditions are: a rapidly increasing dark adaptation through the test period, a wider pupil, a sharp brightness contrast of the test field with the dark surroundings (the spotlight effect), and a liability to inaccuracies in the focusing of the test object. These points are discussed in the paper. The wider pupil at low illumination in relation to the correction of astigmatism is also discussed.

BINOCULAR ANOMALIES AND READING ABILITY*

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It is surprising that until the present decade only sporadic studies have been made of the work of the eyes during reading. Since Eames's comparison of the ocular characteristics of unselected and reading-disability groups, however, some 50-odd reports on the relationship of vision and reading have appeared in the literature. No attempt will be made to summarize them in detail, but the conclusions reached by the authors vary all the way from the remarkable statement of Selzer[30] that: "These conditions of muscle imbalance and alternating vision in addition to the lack of fusion, the writer believes, account for such reading disabilities as are not accounted for by general mental disability," to the conclusion of Imus *et al.*[23] that ocular defects are no more frequent among retarded readers than among superior readers. Some of the reasons for the wide differences of opinion will appear as certain studies of heterophoria and reading are summarized. One of the more important problems involves the validity and reliability of the visual and reading tests used, while another is the fact that there are two mutually dependent though distinct factors involved: (1) The problem of visual hygiene; (2) the problem of education and learning. Some investigators have approached the problem from one point of view while others have attacked it from the other.

DISCUSSION

In 1932 Eames[11] reported his first study of the effect of binocular anomalies on reading ability. He studied two groups of children, 114 with cases of reading disability and 143 unselected children. Both groups were measured for acuity, heterophoria, ductions, and refractive error. Eames believed that the principal finding of his study was the greater amount of exophoria at the reading distance in the reading-disability cases.

Since 1936 the study of this problem has been given more impetus very largely because of the publication of Betts's book, "The prevention and correction of reading difficulties." This book, in addition to treating reading difficulties in general, gives a detailed description of Betts's reading-readiness test. The unique part of this test is the section on visual sensation and perception, which purports to measure the visual readiness of a child or adult in terms of his visual abnormalities. This subsequently led to a variety of studies principally by educators and psychologists but also by eye specialists to determine the significance of these visual defects in reading.

Eames's studies have been more numerous than those of any other one investigator and he has attacked such problems as visual acuity, ductions, phorias, visual fields, and refractive error by comparing unselected and reading-disability cases. Eames's results have been largely positive. He believes that one of his most significant findings was a greater exophoria at the near point, as mentioned above. However, an examination of his data shows that the differences between his groups are uniformly small. For example, in his study[13] of fusion convergence as a factor in reading disability, he compares two groups for fusion using a phorometer stereoscope and the ON-NE

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card. He tested 88 reading-disability cases and 52 controls, and although three-fourths of the reading-disability cases fell below the median of the control group, there was no statistical treatment to determine the reliability of the differences. The difference between the two groups was only about 3Δ, and even if these results are statistically significant, there is a definite question as to the practical significance of such a difference as 3Δ. The results of Eames's other studies[11–16] are largely comparable to this, showing very small differences between groups, although he is inclined to believe that his studies indicate a definite positive relationship between certain visual defects and reading ability.

Eames[13] has given the following interpretation to explain the importance of heterophoria and low fusion in reading: "When the eyes deviate, the retinal images no longer fall on corresponding retinal points and the resulting mental picture is blurred or confused. That is to say, during the stimulation of non-corresponding points there is a super-imposition of images such as to create the impression of a composite word or letter which may be quite unfamiliar or may blend into a familiar looking symbol. Although compensation can clear vision, fluctuation occurs causing the eyes to waver and this increases the fatigue. Improper eye movements may also result."

It is undoubtedly true that in extreme cases diplopia does occur, causing distorted impressions, but numerous studies by Farris,[18] Fendrick,[19] Swanson and Tiffin,[35] Witty and Kopel,[43] Imus,[23] and others have not shown significant differences between normal and reading-disability groups in connection with muscular imbalance as well as other visual defects. The exaggerated claims of Selzer[30] are probably the result of unwarranted generalizations from small unrepresentative populations.

Additional data on this point have been obtained by Clark.[5, 6, 7] Cases of high heterophoria and orthophoria were studied by means of a photographic technique.[5] The subjects were photographed while they were reading as well as while they were making simple interfixation movements. The results from a small number of subjects indicate that during reading the eyes overconverge as they move from the end of one line to the beginning of the next, and that this overconvergence is greatest in exophoria, next in esophoria, and smallest in orthophoria. These overconvergence movements necessitate abductive fusion movements at the beginning of the lines; that is, the eyes are making fusion movements of considerable size continuously during reading and during simple interfixation movements. It is interesting to note that none of the subjects reported diplopia during the reading series in spite of the fact that fusion movements as large as 3 degrees occurred. This may have been due to the fact that these fusion movements require only about one-fifth second. In spite of the size of these movements it seems clear that any excessive reading fatigue resulting from high exophoria is not muscular fatigue, because normal eyes also make corrective movements of a substantial size.

Clark[6] has attempted to explain these overconvergence movements as due to overcompensation and the positive focusing movement in moving between two points; that is, as accommodative convergence. The assumption is that the movement to fixation would involve a positive accommodative adjustment which would in turn result in convergence. Stromberg,[31] however, disagrees with this point of view and suggests two possible

alternative explanations: 1. The contraction of the internal rectus is more rapid in making movements and results in overconvergence. 2. When the eyes are focused on a point at the reading distance, they are converged, and the internal recti receive the greatest innervation. The time required to relax one internal rectus muscle and again contract it may be greater and permit the other eye to move ahead and cause overconvergence.

It is significant to note in connection with Eames's statements regarding fusion that even in cases of very high exophoria and esophoria[7, 8] no movements were evidenced on the eye-movement records which would indicate the possibility of any overlapping of words or letters within the lines. In support of Eames's point of view, however, it might be stated that the testing periods were necessarily brief and that these movements might occur when fatigue had set in. But, on the other hand, extended studies of the effect of fatigue on the eyes by Clark and Warren[9a] indicate that marked abnormalities in ocular behavior are the exception rather than the rule even during extreme fatigue.

A study of alternating vision during bar-reading by Clark[9] indicates that the alternation of vision from one eye to the other does not appreciably alter reading efficiency as measured by eye-movement photography. Bar-readers did show more variation in binocular behavior than did the control group in spite of the fact that binocular vision was present for the last fixation in the lines. These results tend to verify the findings of a previous study,[7] indicating that the eyes do not necessarily assume a position indicated by the measure of heterophoria when they are actually engaged in binocular movements found in bar-reading. When one eye was covered, as in the common cover test, the eyes of these subjects diverged slightly. However, when fusion was prevented by the reading bar there was a greater tendency for the eyes to converge. These results also tend to support the findings of a study of stereoscopic vision,[8a] in suggesting the possibility that at least part of our binocular vision is actually a result of clear seeing with one eye only.

Stromberg[31-34] has made several studies of the relation of ocular anomalies and reading disabilities. In comparing fast (above Q_3) and slow (below Q_1) readers on the Chapman-Cook speed-of-reading test and scores on the Betts telebinocular for heterophoria, Stromberg found no significant difference. Fast readers did show slightly higher ductions averaging 1.57$^{\Delta}$, which is certainly not practically significant.

Another recent study that is related to this problem is that of Peters,[29] who studied the influence of orthoptic training on the reading ability of over 100 college freshmen. The subjects were selected on the basis of reading ability. Although the data are far from conclusive because of the small number of subjects in the critical groups and the unreliability of part of the tests, they indicate tentatively that orthoptic training alone may cause improvement in reading ability. The assumption is that this orthoptic training improves binocular functioning and causes more accurate fixation. However, ocular data were not presented to support this. The experiment would bear repeating with more subjects and more reliable measures.

Contrary to this point of view are the results of Tinker,[37] who studied 64 college sophomores by means of eye-movement photography and found no relationship between the accuracy of fixation and reading ability. Tinker believes, however,

that occasional cases may be aided by orthoptic training. This problem would seem to be an important one to both educational and visual experts.

A comprehensive study of the problem of visual defects and reading was conducted in 1936-37 by Imus, Rothney, and Bear at Dartmouth. Their results, which pertain to the matter of heterophoria, indicate that retarded and superior readers do not differ in binocular adjustments as indicated by an ophthalmological examination. Similar results have been obtained using the Betts telebinocular as the criterion by Stromberg,[31-34] Witty and Kopel,[43] Swanson and Tiffin,[35] and Fendrick,[19] and the author has found similar results, which have not been published, with 200 high-school students at San Jose High School.

In connection with the use of the Betts tests it might be pointed out that their validity has been called into question recently in both the educational and medical literature.[4, 28] The measurement of heterophoria at the reading distance by the Betts test has been investigated in an unpubished study by the writer. A correlation of $+.60 \pm 0.04$ was found between the Betts test and a commonly used prism test. This is not an adequate measure of the situation, however. On the basis of pass and fail it was found that the two tests agreed 88 percent of the time, which gives a sizable relationship between the two tests and would seem to indicate some considerable value for that aspect of the Betts series.

Another study which bears directly on the problem of heterophoria and reading disability was made by Farris.[18] His study involved a number of visual factors, but his conclusion that pupils having monocular visual perception make greater progress in reading than those with poor binocular coördination is interesting. A limitation of this study was the relatively small number of subjects having monocular vision, and as far as the writer knows it has not been confirmed.

One of the most careful investigations of the problem of sensory defects and reading was made by Fendrick,[19] who studied the visual characteristics of poor readers, and Bond,[4] who studied the auditory and speech characteristics of the same group of elementary-school students in New York City. When the groups were studied as a whole, there were no significant differences between good and poor readers as has been found by other investigators. However, part of these students were taught by a look-and-say-technique whereas the rest were taught by a phonetic method. When the students were studied with respect to the teaching method, it was found that visual defects were significant where the look-and-say-method was used; that is, where visual factors were emphasized. In this group, auditory defects were no more prominent in the retarded children. Similarly, when phonetic methods of teaching were stressed, auditory defects became significant and visual defects were less important. The conclusion may be drawn that isolated sensory defects are not insurmountable handicaps in learning to read. Where the situation including such factors as the method of instruction is favorable to the sensory limitations of the pupil, he may be expected to have little difficulty in reading. If, however, the instruction is not adjusted to his limitations, he may encounter extreme difficulty or failure.

Summary and conclusions

The authors of most of the studies reported here have concluded that there is little difference between good and poor readers in the number of visual defects

in general and binocular defects in particular. However, all of the authors state explicitly that the correction of visual defects should be considered as a fundamental part of any reading program and particularly of a remedial reading program.

Some of the reasons for this apparent paradox are the following:

1. Any adequate explanation of reading disability must consider the multiplicity of factors involved; that is, there are many things which may cause reading disabilities. Some of the causes which have been proposed are: sensory defects, eyedness, handedness, word blindness, general intelligence, poor background, improper methods, sex factors, emotional factors, as well as such external factors as illumination.

2. From the point of view of specific visual disabilities, visual-test results are like certain educational tests in that there is no single correct answer. Every finding must be evaluated in terms of the whole child, his physical and psychological condition as well as the way he uses his eyes.

3. Compensation for visual or auditory defects is possible in a number of ways such as stressing a special teaching method, emphasizing another sense modality, the selection of better illumination, or the student may learn to compensate himself, for example, by suppressing one eye.

4. Some visual defects may facilitate reading; for example, myopia and monocular vision, although from the point of view of ocular hygiene they may be serious problems.

5. Subtle factors that are difficult to measure may be important; for example, a visual defect may cause a child to dislike reading because of discomfort, although he is able to force himself to do the work, or perhaps a parent and teachers will drive him sufficiently to make normal progress.

6. Visual defects may and probably do cause retardation in both good and poor readers, so that a comparision of these two groups is inadequate to determine the significance of visual defects.

7. Correction of visual defects in specific cases does result, in time, in marked improvement in reading ability, as any eye specialist or teacher can testify.

The results cited show the wide interest in the study of visual defects and reading and throw a great deal of light on this important and complex educational problem. They indicate quite definitely that very few visual defects are likely of themselves to cause reading failure. One of the important problems for future investigation is the more complete determination of the importance of specific visual defects in relation to reading and the determination of educational procedures that will permit students with visual defects to make progress in reading that is commensurate with their other abilities. Another problem of importance is the value of orthoptic training or the improvement of binocular functioning on reading abilities. Perhaps the most important practical problem is the development and validation of suitable survey tests to indicate which retarded readers should seek the advice of a visual expert to aid in the solution of their reading problems.

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METASTATIC CARCINOMA OF CHOROID WITH PRIMARY FOCUS IN THE PROSTATE GLAND*

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Metastatic carcinoma of the choroid from all sources is a rare entity in itself, the figures varying from 1 to 30,000 to 1 to 300,000, depending on the source of the reports, but the prostate gland as the primary focus is so infrequent that the total number of cases reported in the literature can be counted on one hand.

In 1908 Suker and Grosvenor compiled the first comprehensive summary of cases of metastatic carcinoma of the choroid from all causes up to that date and found 64, including their own. In 1923, Usher published a résumé of 110 cases. In 1934 Hudson found 149 cases, all told. The most complete count of cases was made by O. Ask in 1934, 211 in all, several of which were duplications. Of these 145 were certified by histologic study. Lemoine collected 12 additional cases in which the diagnosis was proved. The first case on record with a clinical diagnosis of metastatic carcinoma was that of Perls, published in 1872. A résumé of the literature disclosed two cases which seemed definitely metastatic from the prostate; one other case which was clinically diagnosed metastatic carcinoma of choroid, but had no section of the eye or autopsy findings from the prostate; another with histologic eye findings, but no careful report as to the prostate findings and no autopsy. The fifth case is presented herewith.

CASE HISTORY

D. T. H., aged 56 years, a white male, married, whose prewar occupation was newspaper reporting and whose occupation during the past years was probation officer for a United States court, was admitted in January, 1938, to the Edward Hines, Jr., Hospital, at Hines, Illinois, for treatment of a genito-urinary disability. There had been no cancer nor insanity in the family. The patient had had "flu" in 1917 and a nervous breakdown in 1927-28. He was a moderate smoker and drinker.

Upon admission, with a diagnosis of carcinoma of prostate from another veterans' facility, he was given deep X-ray treatments to the prostate gland, together with implantation of radon seeds, from January to March, 1938. In July he began having pains down his back, from the neck to the base of spine, including the ribs.

He had some genito-urinary symptoms that are not pertinent here, and had lost 30 pounds since his discharge from the hospital. He had had several attacks of vomiting.

A genito-urinary examination by Dr. McDougal revealed the presence of a hard enlarged and irregular prostate, the cysto-urethroscope showing a fungating or nodular tumor mass involving the internal urethral orifice, probably extension from the bladder. Although clinically there was no question as to the diagnosis of a carcinoma, several biopsies taken through the cysto-urethroscope were unsuccessful in confirming the diagnosis. No further efforts were made to obtain a satisfactory specimen as the patient was too sick at the time to be disturbed with too much cystoscopy.

X rays of the dorsal lumbar spine taken

* From the Department of Ophthalmology of the United States Veterans Facility (Edward Hines, Jr., Hospital), Hines, Illinois. Read before the Chicago Ophthalmological Society, November 20, 1939.

in January, 1938, were negative, but a film taken of the pelvis showed a definite evidence of metastatic invasion.

At the time of his admission to the hospital in October, 1938, the tumor mass in the prostate gland had markedly decreased and nothing was visible with the cysto-urethroscope. However, the X-ray studies of the lumbar and dorsal spines revealed marked changes resembling X-ray findings of metastatic malignancy,

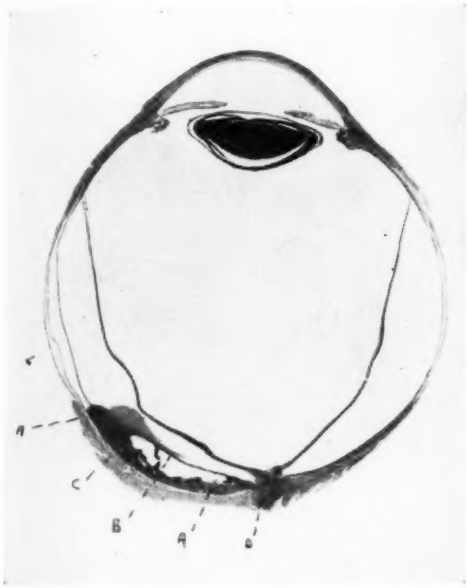

Fig. 1 (Kulvin). Sagittal section of carcinomatous eye. A, choroidal tumor; B, inner choroidal layer; C, detached retina; D, optic nerve.

probably from the prostate. The ribs adjoining the thoracic vertebrae showed metastatic involvement.

Blood examination revealed red cells ranging from 4,500,000 in October, 1938, to 2,000,000 in June, 1939.

Wassermann and Kahn tests were negative.

At the time of his first eye examination, on March 10, 1938, the vision in each eye was 20/20 with no changes noted in the fundi. At a later examination, on December 13, 1938, vision in the left eye was 20/20. In the right eye there was partial vision below with flicker of light in the other directions. The fundus of the left eye was normal; the disc of the right eye was moderately edematous and blurred. The retina appeared to be detached below the disc and laterally. Over the apparent detachment, the blood vessels seemed to end in small knoblike dilatations. Transillumination from below the pupil revealed a slight impairment of the reflex in the pupillary area, suggesting the possibility of a tumor. The patient was then seen by Dr. William Mann, consultant in ophthalmology, whose report stated,

"The fundus reveals a marked hyperemia and slight swelling of the disc. To the temporal side and involving a large area including the macula is an elevated, irregularly pigmented mass of 6 D. (2 mm.), definitely a tumor mass without real detachment of the retina. Diagnosis: Carcinoma of the eye secondary to prostate most likely; advise enucleation and biopsy."

The eye was removed on January 4, 1939. The patient was discharged from the hospital as a terminal case. He died on February 4, 1939, at the U. S. Veterans' Hospital at Wadsworth, Kansas. No autopsy was obtained. The eyeball was sent to the Tumor Registry, at Washington, D.C., and a report was furnished us by Colonel Ash, Curator of the Army Medical Museum. The report was made by Captain DeCoursey, as follows:

Gross Findings. The eye measures 2.7 by 2.5 cm. Posteriorly, covering the optic disc, the choroid is densely thickened to 3 mm.

Microscopic. There are central posterior synechiae. Lipohyaline degeneration appears on the ciliary processes. In the retina the normal amount of peripheral cystic change for this age appears. Immediately overlying the choroidal tumor

mass the retina is detached and shows an area in the outer plexiform layer filled with pigmented epithelial cells. There are a few perineural areas of serous exudate in the outer plexiform layer. An area of cytoid bodies appears between the optic disc and the pushed-aside nuclear layers. The optic disc is edematous. Thickening of the vessels on the optic disc is distinct. In the choroid, adjacent to the optic nerve canal and extending about half-way to the equator, there is a mass of wild tumor cells which form a typical gland. The cells are mostly columnar and their nuclei tend to be placed basically. A red-stained fluid appears in the lumina. The nuclei are vesicular and often multi-nucleolated. Large cystlike areas containing serum and pigmented macrophages are present. The choriocapillaris is generally uninvolved. Mitotic figures are rather common. No mucin is demonstrated.

Diagnosis. Metastatic carcinoma of the choroid from the prostate.

Discussion

The first recorded note of a metastatic carcinoma of the choroid from the pros-

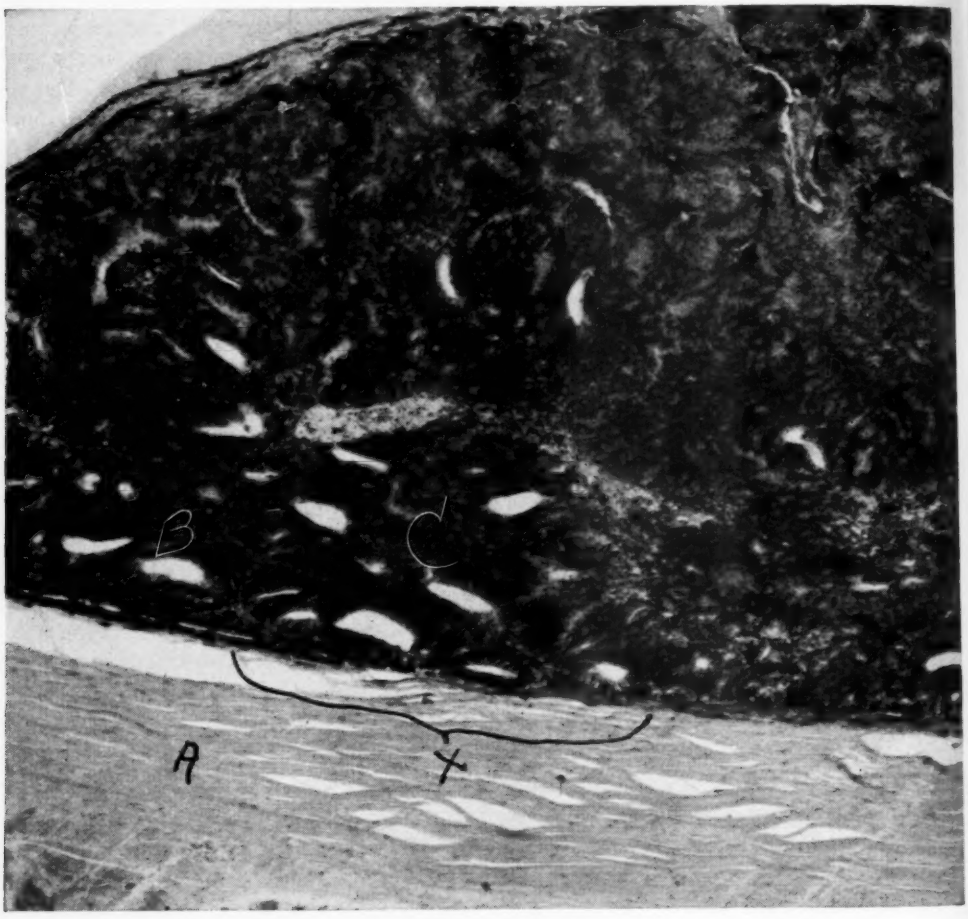

Fig. 2 (Kulvin). Low-power section through anterior end of tumor. A, sclera; B, acini composing tumor; C X, section photographed with high-power magnification in figure 3. ×80. U. S. Army Medical Museum negative no. 69245.

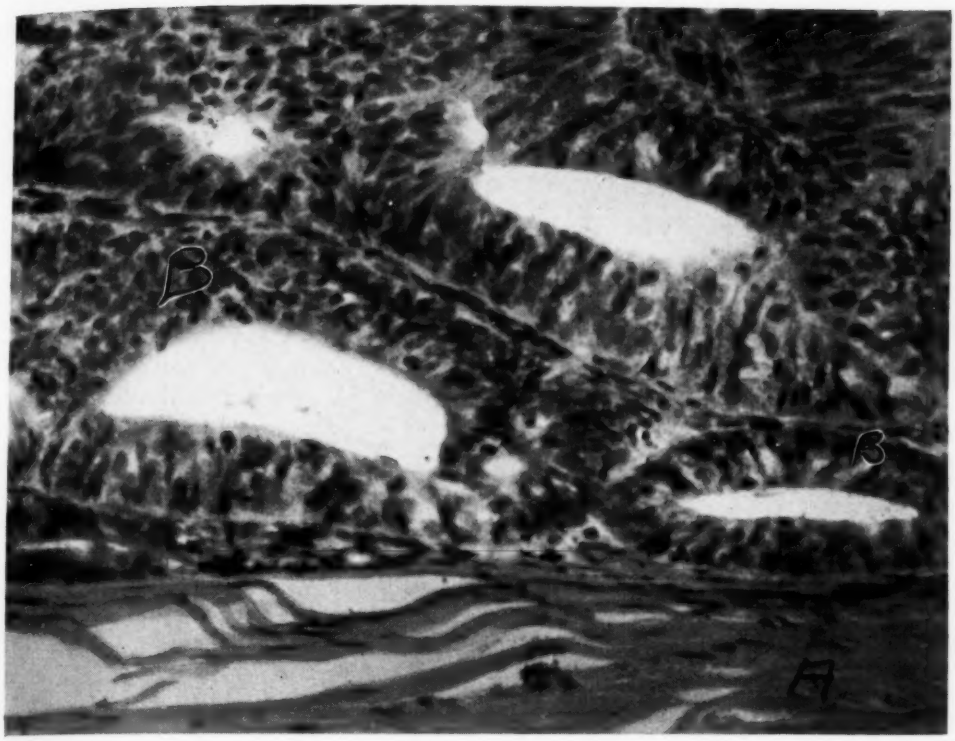

Fig. 3 (Kulvin). Section included under figure 2 as C X. Tumor cells in glandular formation—showing nuclei placed basically and cells of columnar type. ×330.
U. S. Army Medical Museum negative no. 69013.

tate was published by Dr. Allen Greenwood in 1903, and had all the findings in both the eye and the prostate. Yet for some reason, Dr. Southard, who performed the autopsy, made the following report,

"Anatomically the case shows carcinoma of the prostate with extension into the retroperitoneal pelvic tissues, carcinoma of the intestine, liver, spleen, lung, mediastinum, thoracic cage, pia mater, and eye. From the anatomical and histological evidence alone, one would scarcely be warranted in assigning the prostate as the original focus of the tumor. But the case as a whole taken clinically as well as pathologically seems to warrant the interpretation as a case of carcinoma of the prostate with multiple metastases."

So it seems that clinical findings appear paramount though the autopsy findings are present.

In 1908, in his study of the first 64 cases that he found in the literature, Dr. Suker made a number of keen observations that, with a few exceptions, have apparently not been refuted nor discounted by any observers. His conclusions were the following:

1. Metastatic carcinoma of the choroid occurs only between the ages of 30 and 60 (several cases found up to the age of 70 in later reports). 2. Invariably the primary growth is found in some other organ. 3. There is a great tendency to bilaterality (Usher stated at least one third of the cases are bilateral). 4. There is an exceedingly rapid loss of vision (in our case the vision was normal in March and only light perception was present in December). 5. There is a uniformity noted in the lodgement of an embolus in the ciliary arteries. 6. There is a uniformity in the character of the growth. 7. The short duration of

life after its appearance in the eye, as a rule, is not more than four to five months (the longest, 14 months). 8. There is a marked rapidity of growth along paths of least resistance. 9. Very little tendency to perforate the globe is notable. 10. There is an excessive detachment of the retina. 11. There is a relatively large percentage of minus tension—possibly because of the detachment. 12. There is a great tendency toward having all three types of carcinoma in the same individual, scirrhus, medullary, and adenomatous. 13. There is a tendency for directly involving the blood vessels. 14. The tumor cells rarely invade the retina and disc either by extension or tertiary metastases. (McDannald and Payne disagree and state the growth may break through the retina into the vitreous.) 15. There is a seeming regularity with which the tumor encircles the disc. 16. The characteristics in general are directly opposite to those of sarcoma.

The cause of the growth of the tumor on the temporal side of the eyeball has been explained by McMillan. He showed that the ophthalmic artery leaves the internal carotid artery at a right angle and where it turns upward it gives off the short posterior ciliary arteries, as one long branch whose axis is parallel to the long axis of the ophthalmic. These arteries have a variable origin from the ophthalmic artery, arising either as two single trunks or as a group of six to eight vessels. In either case they divide behind the globe into about 20 vessels which pierce the sclera obliquely. The majority do so in a ring around the optic nerve. Consequently, an embolus, once in the ophthalmic artery, is more likely to be directed to the temporal side along the short posterior ciliary arteries.

The rarity of metastases to the choroid has been ascribed by DeLong to the same right-angled origin of the ophthalmic artery from the internal carotid. As the central artery of the retina also has a right-angled origin from the ophthalmic artery it is less frequently involved than are the short ciliaries.

According to Parsons, the left eye is involved more frequently than the right, due to the more direct pathway of the left carotid artery. In the five cases having the prostate as the primary focus, or supposedly so, three right eyes and three left eyes were involved.

I should like to refer again to the general subject of metastatic carcinoma by presenting a table compiled by Usher in 1923 of the relative frequency of primary growths in various parts of the body in the male and female.

TABLE 1

DATA ON METASTATIC CARCINOMA COMPILED BY USHER (1923)

	Breasts	Lungs	Stomach	Thyroid	Liver	Rectum	Esophagus	Adrenals	Ovary	Prostate
Males	3	6	2	1	2	2	1	1	0	1
Females	62	4	1	2	1	0	0	0	1	0
Total	65	10	3	3	3	2	1	1	1	1

Ask prepared a table showing that carcinoma of the breast was responsible for 50 percent of the uveal metastases but has a relative frequency among all types of tumors of only 13.5 percent. Carcinoma of the stomach, on the other hand, has a relative frequency of 36.5 percent and produced only 3 percent of the uveal metastases.

He believes that carcinoma in certain primary sites, such as breast, bronchi, lungs, and prostate, tends to produce uveal metastases while carcinoma in other locations—stomach, uterus and ovaries, and skin—has opposite tendencies. He felt this to be due to the tendency of certain types of carcinoma to produce

hematogenous metastases, rather than evidence of any particular attraction for uveal tissue.

Lemoine and McLeod felt that if hemotogenous metastases were responsible the other branches arising from the ophthalmic, such as the central artery of the retina, the lacrimal artery, and the supraorbital branch, should receive the emboli once they have invaded the ophthalmic artery, as well as the short posterior ciliary arteries. It is their belief that the cells which reach the choroid, and to a lesser extent the iris and ciliary body, find nutritional conditions favorable and grow—elsewhere they perish. They postulate a specific affinity of uveal tissue for cells from carcinoma of the breast, bronchi, lungs, and to a lesser extent prostate.

The next table contains a compact résumé of all five known cases primary in the prostate. If there are others, I have been unable to find them. However, in Ask's tabulations, there was one more case (W. E. Fry) presenting a primary tumor in the prostate, which he classified as carcinoma. On looking up the original report, I found that it was a report on sarcoma, and while it is malignant and had the same metastases to the choroid, I excluded it from consideration as we are dealing with carcinoma only.

The diagnosis of metastatic carcinoma of the choroid according to Usher should be made on:

1. The situation of the lesion at the posterior part of the choroid. 2. The gradual shelving of the swelling to the normal fundus level. 3. The prominences on the surface of the swelling. 4. The ill-defined margin, flatness (2-3 mm.), and pale-gray color. 5. The rapid increase of growth. 6. The black pigment spots which may be present on the swelling.

The following table by Dr. A. Greenwood presents the differential diagnoses between metastatic carcinoma and sarcoma of the choroid. It seems to be comprehensive.

As far as treatment is concerned, this has always been considered as palliative, since it was understood that metastases to the choroid presented a terminal

TABLE 2

DATA ON METASTATIC CARCINOMA OF CHOROID PRIMARY IN PROSTATE

Author	Where Published	Eye	Tension	Path. Exam.	Primary Growth	Secondary Metastases	Life Expectancy	Age Years
Greenwood and Southard	Boston Medical Journal, 1903, v. 149	L	+	2 flat tumors in choroid fused	Prostate	Bladder, perineum, lungs, pleura, pericardium	Few months	59
O. Fehr	Klin. M. f. Augenh., 1918, v. 60	R	−	Choroidal tumor (clin. only)	Rectum and prostate, no autopsy	—	—	50
H. B. Stallard	Proc. Royal Society Med., 1933, v. 26	L	++	Choroidal tumor and iris tumor	Bladder and prostate?	?	4–5 months	59
F. Ask	Hospitalstidende, 1914, v. 7	R & L	?	Tumor in choroid	Prostate	Lungs and other organs	?	35
M. M. Kulvin	Amer. Jour. Ophth., 1940, v. 23.	R	−	Choroidal tumor	Prostate (clin. finding)	Ribs, pelvis, dorsal and lumbar spine	3 months	56

COMPARISON OF METASTATIC CARCINOMA AND SARCOMA OF CHOROID (GREENWOOD, 1922)

	Carcinoma (Metastatic)	Sarcoma
Situation	Posterior, usually temporal and not far from macula	Usually equatorial or farther forward, rarely near disc
Shape	Flat discoid with thin edges, rarely elevated more than 2 or 3 mm.	Round or nodulated
Color	Gray or white without pigment	Usually dark gray or showing much pigment and mottled
Projection	Very little if any projection into vitreous	Projecting far into vitreus
New Vessels	Not present	Usually present
Retina	Very slightly projected at first by tumor and with little subretinal fluid. Separation of retina around tumor comes quickly and spreads rapidly as tumor grows and soon becomes complete	Projected into vitreous early by tumor, and separation of retina around tumor comes slowly and does not become complete until much later
Vision	Early disturbed and soon lost owing to rapid growth under or toward macula	Centrally not early disturbed, and not quickly lost unless glaucoma appears
Tension	Not usually increased in early stage and amenable to miotics	Usually raised early, and acute glaucoma almost inevitable if eye not enucleated early enough. Not affected favorably by miotics
Enucleation	Almost never necessary and of no value to patient unless for unrelieved pain. Does not prevent metastases	Always necessary, as early as possible and of great value to patient in preventing metastases
Occurrence	Always metastatic, and primary focus or other metastases can usually be found. Often bilateral	Always primary, seldom if ever bilateral, and causes metastases later
Treatment	Palliative	Early enucleation
Prognosis	Inevitably bad	Good if seen early, though metastases to liver may occur

condition—the life expectancy after the diagnosis in the eye was made being about four months—one case lasting 14 months.

Uckerman, in 1928, tried X-ray treatment over the eyes with some improvement of vision, but no microscopic examination could be made.

Zentmayer reported one treatment of radium to the eyes with no effect.

Lemoine and McLeod report the first successful treatment with röntgen rays, whereby useful vision was restored in one eye until the final stages of life. The detachment of 15 diopters receded to 1 diopter and vision improved from 8/200 to 15/50 with correction. This seems to be an encouraging result, yet what benefit there is to be derived when the life expectancy at the most is several months is not clear.

SUMMARY

There is presented a case of metastatic carcinoma of the choroid, wherein the primary focus is considered to be presumably in the prostate gland.

A complete search of the literature discloses only four other similar cases. The clinical diagnosis is confirmed by microscopic study of the eye.

Many thanks are due to Dr. Jeremiah Last of the Hines Hospital staff for assistance in the compilation of the bibliographic material.

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A CLINICIAN'S EXPERIENCE WITH SULFANILAMIDE*

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Those of us who were in practice the last quarter of the previous century can recall how numerous were the remedies, composed of certain newly discovered chemical compounds, enthusiastically presented as infallible cure-alls only to be found wanting in quieter moments, abandoned, and consigned to the limbo of forgetfulness. Thoughtful therapeutists on the rebound turned, however, to the old pharmacopeia for a cast-aside galenical that had been useful long ago in the given cases. When administered to laboratory animals those new compounds produced marvelous effects; so, because of these actions, they were boldly offered as remedies for the ills of the human being. Since then through refinements in the chemistry of the compounds and the extension in physiological research much new light has been thrown on their therapeutic uses.

In the past 10 years, when the marvels attending the giving of sulfanilamide and its varieties to those whose general health had been affected by certain bacterial organisms were becoming verified, some such thoughts must have come into the minds of observing practitioners. When informed that in malignant types of pneumonia the processes were aborted as if by magic, we were startled but fearlessly inquired, "Might not that release have been consonant with the natural history of the disease and the giving of the new drug have occurred on the critical days—'crises' which might have appeared irrespective of any therapeusis?" Doubters became more and more doubtful and suspicious of the vaunted truthfulness of the statements. Yet the uses of the new chemical were extended. Others, more open-minded, watched the results obtained by cautious, thoughtful observers. More and more, the latest results became known and, through laboratory research, the new compounds were found to possess specific actions on certain types of pneumococci, streptococci, and others. By their absorption and elaboration within the human economy the blood and lymph streams became so fortified as to erect a bulwark against the action of the malignant organisms.

Such thoughts were in my own mind, for one, in the past two or three years; I was skeptical of some of the statements and overcautious in accepting them as possibly useful for the ophthalmologist. Nevertheless I had a spark of hope that he might find the new drug valuable in his practice just as had the surgeon and the internist. Accordingly, casting aside my doubts I confidently prescribed sulfanilamide, the effects of which astonished me. Tonight, I desire to present brief accounts of a variety of affections in which it has been employed.

1. A case of long-standing trachoma. In a man of 30 years, the conjunctiva of the right eye was folliculous and the cornea almost obscured by pannus. The left eye from disease or injury in childhood was shrunken and almost invisible through the edematous and trachomatous conjunctiva. The case was suitable for surgical treatment, but because of the loss of the left eye, the man obstinately refused to submit to any surgical procedure. The patient could not be regular in his visits, but he entreated me to take his

* Read before the Section on Ophthalmology, College of Physicians, Philadelphia, December 21, 1939.

case without demanding anything more than palliation of his distressing symptoms. Quite two years' attention was given him. Everything I had ever used in trachoma was applied in his case. Despairing of helping him I decided to try sulfanilamide. After three days I was astounded to note the lid fissure had become wider, the globe paler, and the discharge scanty. He was a walking patient and distinctly neurotic, and, to avoid unpleasant symptoms, only so small a dose as one grain thrice daily by mouth was ordered for him. There were no unpleasant effects. Six days later there was marked reduction of all symptoms. Eleven days after the first dosing, the eyeball became free from all visible injection; the tarsal conjunctiva smooth, except here and there tiny whitish concretions beneath the membrane; altogether the picture resembled the stage preceding cicatrization. The dose was increased to five grains thrice daily after two weeks. One month later I wished to write *cured* as the tarsi were thinner and smooth, the globe white, and the cornea free of visible pannus. The limbal shoulder had flattened, the cornea sparkled, and there has been no discharge since. Vision was 5/12. In the meantime all the symptoms in the left orbit have faded. All reaction has disappeared; but in clear daylight the lines of the empty vessel coursing his cornea annoy him. The patient now desires to have the shrunken globe excised, and a sphere inserted so that a glass eye might be adjusted, for he has at last been accepted for employment.

Last week he brought his aged mother, who was the original victim in the family. Besides entropion the conjunctival membranes are atrophic and without follicles and the cornea grayish from old pannus.

2. *Intractable keratitis.* On July 17th last, as I was leaving for a brief holiday, a man came with signs of a superficial infiltration and loosened epithelium of the cornea of the right eye. Since March he had been under others' care as an outpatient in a distant hospital. Regarding his case as one of incomplete healing of a superficial ulceration I applied boric ointment and a snug compress. The next day the condition was unchanged. The man refused to go to another during my absence but insisted that I should go on my journey; he was altogether disheartened and had given up hope of cure, declaring he could not be worse than he had been for the past six weeks. He'd think it over as to what he would do on my return. On my arrival in the city on August 5th, he came again but conditions were unchanged and huge blebs had formed on the cornea. A general examination threw no light on his case. In the succeeding weeks everything I had ever used in similar cases was tried. "Pregl packs" were ineffectual. The original infiltrate, more or less quadrate, had faded but was replaced by a lengthy sickle-shaped one. The cornea was vascular and the whole surface of the membrane seemed not to be intact. Despair seized both patient and doctor. On August 19th sulfanilamide, 5 gr. by mouth, was ordered. Two days later the eye was white except at the point where the vessels crossed the limbus near the sickle-shaped infiltrate. Two days later the epithelium was found intact and shed fluorescein stain. The quadrate infiltrate already mentioned had faded completely but the sickle was somewhat longer, and more vessels crossed the limbus. All general symptoms had subsided. Vision was 5/9. Sulfanilamide was increased to 20 gr. in the day. On December 4th the patient, free from all annoyance was able to read 5/10. He reported on that day because his wife, harassed by the long course of the disease, could not credit that it was possible for him to be without symptoms for so long an inter-

val. He has returned to his business and I have no later notes to give.

3. Uveitis. Two patients have been cured. The first, an aged man whose cataracts had been removed for 10 or more years. His left eye became inflamed 10 months prior to his reporting to me. All physical examinations failed to throw light on this case. Every remedy I had used in other patients in previous years failed to mitigate the symptoms. Sulfanilamide, gr. 5, was prescribed on August 8th. On August 11th the injection of the globe was less marked and, five days later, both eyes were white again. The tablets were to be taken for the succeeding three weeks; as much as 30 grains in the day had been employed, but after September 19th the quantity was reduced to only 5 grains in the day. On September 12th, all fundus details were visible. With his spectacles, he had vision of 5/15 and was able to read the newspapers. He had worn the original aphakic correction but on October 6th, with a new formula, vision was 5/10.

The other patient, a sufferer from chronic arthritis, came because of violent iridocyclitis, in March, 1937. There had been repeated attacks affecting only the right eye, but none so violent as this. After three months the synechiae became broken, and recovery followed. In April, 1938, the left eye was affected. It was difficult to manage all details of the treatment as this clergyman was a food faddist whose officious wife carried on a correspondence-course with a Western concern that flagrantly vaunted products deemed by her to be more potent than solutions of atropine to prevent iritic adhesions.

All symptoms were allayed, however, by June, and so continued until August, 1939, when the right eye became inflamed, the iris completely immobile. Repeated instillations of atropine effected only partial expansion of the pupil; the aqueous and the vitreous were too clouded for exploration of the fundus.

Small doses of sulfanilamide were ordered and frequently repeated so that in 24 hours 40 grains should be taken. Four days later the globe was free from congestion and through the fully expanded pupil the media so clear that the background could be seen distinctly.

Sulfanilamide, gr. 5, was then ordered to be taken three times a day. I have had no report since September 15th, when the visual results without glasses were R.E. 5/12, L.E. 5/15.

4. Recurrent vitreous hemorrhage. A young man, who over a period of years had had in each eye recurrent vitreous hemorrhages, came because he was blind in his left eye. The vitreous could not be penetrated by the mirror's beam. The media of the right eye were clear, and no gross anomaly was present. Absorbents were employed. After two months the media of the left eye became transparent so that 5/20 was appreciated. With the slitlamp, a few months later, a fine granular veil was made out in the right eye.

All special examinations were valueless. He was not tubercular nor spyhilitic —but in his boyhood he had had hook worms. The record of the infestation was procured from the board of health of his native Southern state. In his letter to me the examining physician declared that "Hook worm disease can not be cured"; yet, by the examinations made under my direction no worms nor ova were found.

In October, 1938, a brilliant reflex from the fundus could be obtained, yet no details could be made out. On November 25th, while the young man was resting quietly, without warning, the sight of the right eye "went blank." The left cleared after a few weeks and the details of the fundus became distinct, so that by the end of January, 1939, the visual acuteness was

up to 4/18, although 4/12 could be made out. There was distinct clearing of the right eye also, but the fundus details were not visible. Progress was slow; the media of each gradually became clearer so that vision was R.E. 5/7, L.E. 5/10.

On September 16, 1939, hemorrhage again blinded the right eye. Sulfanilamide was given, and after three days the clearing became so marked that by October 10th, vision in each was 5/18. The sulfanilamide was given in doses frequently repeated so that 40 grains were taken in 24 hours.

The details were not visible in the right eye by December 1st; the left, however, was so clear that the patient was able to go about, driving his car and attending to business. This week (December 21, 1939) the vitreous has cleared so much that the details can be made out. There is a large opacity occupying the nasal chord of the vitreous body.

5. Bullous keratitis in an old blinded glaucoma. An aged lady whose left eye had been excised because of the effects of glaucoma, and the right blind from the same cause, came for the relief of frequently recurring distress. I found ruptured blebs and a roughened cornea. Iridectomy had been performed 10 or 12 years ago, but the eye was sightless. All sorts of efforts were made to quiet the condition but without avail, as the blebs occurred and recurred. In August, 1939, sulfanilamide in small doses was given. By the end of a week the cornea became so smooth that it shed staining fluids. No bleb has been seen since and the eye is no longer painful. The nebulous membrane has become so clear that the crypts of the iris can be distinguished.

Finally, a case of uveitis. This occurred in a man recovering from prostatic disease. The iris and ciliary region of the right eye were violently inflamed; the aqueous so turbid and the vitreous so cloudy that no fundus detail could be made out. Beside such usual local attentions as are commonly employed, sulfanilamide was prescribed up to 60 grains in the day. At the end of 10 days complete clearing ensued, and the fundus details could be readily made out. With correcting glasses, full vision was obtained.

I must admit that my employment of sulfanilamide has been purely empirical. Loe's* results at the Indian Reservation in Dakota were known to me, so that in my case of trachoma I was guided by his reports.

After the rapid subsidence in the cases of uveitis it gave me comfort to learn of Mengel's** experiments in which he had found sulfanilamide in the vitreous within an hour after its ingestion. Just as he has suggested that the substance should be of value in infections of the eye, so had I secured the rapid clearing of the vitreous in my cases of uveal disease.

To all my patients the chemical was given in small doses by mouth. None had unpleasant systemic reactions. I regret exceedingly to have withheld its use in a case of panophthalmitis coming on in a blind glaucomatous eye which had been iridectomized 10 years ago because the man has a serious cardiac lesion.

In the corneal cases speedy reduction of pain and discomfort followed on the first day's use. I regard sulfanilamide as possessing analgesic properties. In these patients the great vascularity of the tarsal surfaces became so much reduced that the weight of the lids on the cornea was lessened and the effects of their pressure abolished. The action on the congested membrane was the same as that noted in the trachomatous eyes.

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* Arch. of Ophth., 1938, November, p. 880.

** Arch. of Ophth., 1939, v. 22, September, p. 407.

The small dosage was remarkably effective, in no instance was more than 60 grains given in the 24 hours. Thus far I have no reasonable explanation of the action of the chemical on long-existing nonsuppurative affections.

In all the patients no other medicines were prescribed or used after the sulfanilamide was begun. In any of the eyes here described I cannot ascribe the almost dramatic subsidence of the inflammatory processes to the effects of the cumulation of all that had been used prior to the employment of the new chemical, but unhesitatingly adduce their recovery solely to sulfanilamide.

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SOME INTERESTING MUSCLE CASES WITH COMMENTS

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The following cases are presented to illustrate certain points in diagnosis and treatment and to prove certain beliefs of mine—not because they are rare. To save time, only the essentials relevant to the point at issue will be mentioned.

Group A. Anatomical Anomalies

1. Three cases of vertical deviation with signs pointing to weak superior recti in which at operation the distance of the insertion from the cornea was measured with Walker's scleral ruler. The deviations were 8$^{\Delta}$, 19$^{\Delta}$, and 26$^{\Delta}$, and the insertions were 8½, 10, and 11 mm., respectively, from the cornea. The normal distance averages 7.7 mm., so it will be noted that the set-back in these cases was practically proportionate to the degree of deviation. Men who do the recession operation claim that a moderate set-back (3-5 mm.) does not impair function. These cases show definitely that congenital set-backs do impair function, so it seems fair to assume that an operative set-back will cause a similar, or worse, impairment.

2. Two cases of bilateral congenital abducens palsy in which the tendons of the interni were so wide that they reached to the inner margins of the insertions of the vertical recti. Such enormous and rigid muscles constitute an immovable opposition to any transplant operation. These cases show the importance, in all congenital cases, of first exposing and treating the interni before transplanting the vertical recti.

Group B. Paralysis of Divergence

Case 1. A congenital case in which, luckily for me, the diagnosis was made before operation and the difficulties fully explained to the parents. Since April, 1937, both interni have been centrally cut and both externi shortened twice—the first time using a double-over cinch loop and the second time a single over. Practically no improvement, except in positions under two feet, is evident from all this work.

However, all this time monocular vision has been preserved in each eye by alternate occlusion, and fusion exercises have developed stereoscopic binocular vision. The child is only 5½ years old now, and it is my intention to mark time for a number of years, preserve monocular and binocular vision, and do whatever is indicated when the head has reached full size.

The comment is obvious. Be on the lookout for such cases so that the diffi-

culties of correcting troubles, due to defects in nerve hook-up, by working on the muscles can be explained *before* operation.

Case 2. Acquired through head injury. This patient had constant diplopia due to an esophoria of 25Δ for distance, which lessened on convergence until at 8 inches from ocular centers there was perfect balance.

The eyes were normal in all other respects and there was no impairment of any rotation.

As in the first case the difficulties were explained to him and to the insurance carrier.

Operative treatment was the same as in the first case except that the interni were not cut—this to avoid any interference with reading comfort.

The final result is an esophoria of 8Δ for distance with orthophoria at the normal reading distance (14 inches). The diplopia for distance is relieved by a pair of 2 diopter prisms, bases out.

Comment. The most important point in this case is the impairment of convergence and of inward rotation of each eye in spite of the absence of any cutting of the interni. This proves what I have been trying to "put over" for many years. *That an excessively shortened muscle cannot relax enough to permit normal rotation in the other direction.* Because of the absence of stitch slippage the cinch is the only operation by which this fact can be *proved.* Most operators, certainly those who use other methods, believe that if a certain amount of shortening will give a certain effect, more shortening will give a proportionately greater effect. This is not true because the eye recedes into the orbit and, in stitch operations, the greater the shortening the greater the tension on sutures, thus increasing the tendency to cut through and so lessen the effect. These are elementary facts to the general surgeon.

Group C. Several Cases to Illustrate Important Points Related to Binocular Vision in Squints

Case 1. A girl of 17 ears, who had squinted since her fifth ear. An alternating case with 20/16 vision in each eye and only simultaneous perception in the outskirts of the fields. Only a cosmetic result was hoped for. On January 3, 1931, a cinch operation was performed on the right externus and the internus centrally cut. This produced parallellism of the eyes. Fusion training was started on February 28, 1931, and in one week the patient was able to overlap red and green colors in the amblyoscope tube. By August, 1931, she was able to fuse dissimilar pictures such as the F and L to make E. One-and-one-half years later she had stereoscopic perception although she had done no training since the first week! At this last visit she tested orthophoria (lateral and vertical) with the Maddox rod.

Case 2. A girl who was treated from the twentieth month with lenses and alternate occlusion. About her third birthday I performed a cinch operation on one externus. She was in the office the other day and, *although she has had no fusion training,* tested exophoria 1½Δ, vertical orthophoria, normal monocular vision in each eye, and stereoscopic perception of all but the most difficult cards in the Guibor series. She is now 12½ years of age and has a normal *pair* of eyes.

Case 3. A boy of 12 years seen recently. He has had constant headaches due to an esophoria of 15Δ. He has had four years of fusion training without any relief but was relieved at once by a pair of 3Δ prisms, bases out. Three months after these were prescribed there had been no return of the headaches. However, sooner or later, he may need opera-

tion for the remaining 9^{A}. And some authorities(?) contend that prisms, bases out, cannot be borne and will not even try them. It seems easier than four years of useless "muscle exercises."

Case 4. A 12-year-old child who had been operated on at 3½ and again at 4½ years for convergent squint. When seen by me not long ago there was *no fixation* in the squinting eye in spite of *four years of fusion training three times per week!* One month's occlusion failed to develop fixation!

Case 5. A little girl, eight years of age, on whom I recently operated, for cosmetic purposes only, had been under the care of ophthalmologists since her sixteenth month. No occlusion had been advised till a year ago, and then only in a partial way. However, he did give fusion exercises in the absence of fixation in one eye!

Comments. Cases like these can be multiplied many, many times. Cases 1 and 2 prove that binocular vision can occasionally be learned at any age solely by experience. The patient in case 1 may have learned it before the squint started and it had revived itself when the eyes were made parallel. Case 2 proves the fact, as her eyes had never been straight till operated on. But the operation *must* be one that does not impair monocular or binocular functions.

Case 3 proves the occasional value of prisms, bases out. Did I get, for curing his headaches, a fee equal to the total of three fusion treatments per week for four years? One guess is permitted.

Cases 4 and 5 make one wonder how reputable ophthalmologists can do a thing so silly as to give binocular training to one-eyed individuals. Is it just a prolonged mental lapse or—the alternative is hard to believe.

To the ordinary mind it would seem to be self evident that each eye must first be trained to see before the eyes can be trained to see as a pair. I have one patient with double partial optic atrophy, lenticular opacities, and corneal maculae reducing the vision in one eye to 20/50 and in the other to 20/25 part. She had a course of fusion training, although there was no ocular disalignment, in the office of one of the leading ophthalmologists of this country.

The commonest defense of this racketeering practice is "We must compete with the optometrists." Personally I can see no excuse for making a thief of oneself simply because a nonmedical competitor makes one of himself.

450 Sutter Street.

BLOOD DIFFERENTIAL COUNT IN CHRONIC GLAUCOMA

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Probably all observers agree today that glaucoma is not a disease involving the eye alone but is an ocular expression of some subtile, and to date unrecognized, factor or factors. It is neither possible nor profitable to present all of the ideas that have been put forward in the effort to understand the symptom complex which we call glaucoma. The evidence of disturbances in the vascular system, the sympathetic and parasympathetic nervous systems, endocrine imbalance, psychogenic factors, and others are all well known.

Much work has been done in the chemistry of glaucomatous patients, the blood content of calcium, potassium, chloride, iodine, and so forth, having been presented by various writers. In the October, 1937, issue of the British Journal of Ophthalmology there appeared an interesting article by Farid Massoud, of Cairo, Egypt, entitled "Extra-ocular influence in glaucoma (constitutional factors)." The author states that "in the cellular elements of the blood a change occurs in both the red and white corpuscles. An increase in the number of red cells has been noted (Passow), while a change in the differential leucocyte count also occurs. This change in the white cells consists in a relative increase in the large mononuclears I have been able to demonstrate since 1929. In acute cases of glaucoma the large mononuclear leucocytes may attain the remarkable extent of 15 to 20 and even 30 percent. One noticeable feature in this connection is their apparent independence from any operative relief of intra-ocular tension, their presence seeming to depend not so much on the local condition of the eye as on a general pathological process underlying it, as will be presently explained. Sufficient to refer here to the opinion of Wright, who mentions the probable presence in glaucoma of certain toxins interfering with the function of the reticulo-endothelial system."

Massoud then presents a table of the differential leucocyte count in the cases of 10 patients from the Giza Ophthalmic Hospital. The percentage of large mononucleated cells varied from a low of 4 to a high of 30. In some of the cases several counts were made, showing marked variation in the percentage of large mononuclears, from a low of 8 to a high of 30 in one case. There appeared no consistent variation in the cases in which several counts were made, some being higher at the beginning of the treatment of the glaucoma, some lower, and some the same at the beginning and at the end of the blood studies.

The article referred to concludes with statement, "The increase in the large mononuclear cells of the blood might be made use of as one of the early signs which, in conjunction with others, helps in the diagnosis of suspected glaucoma." In view of this expression it seemed worth while to make a leucocyte count on a fairly large number of cases in order to determine whether such a high mononuclear percentage can be found in glaucoma patients in a northern climate. Blood smears from 100 successive cases of chronic glaucoma from private practice were therefore taken. The table shows the age, the known duration of the

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TABLE 1

DATA FROM 100 CASES OF CHRONIC GLAUCOMA

Case No.	Age	Sex	Known Duration of Glaucoma	Highest Recorded Tension (Schiötz)	Complicating Conditions	Differential Blood Count (%)					
						Monos.	Non. Seg.	Seg.	Lymph.	Eos.	Bas.
1.	68	M	5 yrs.	40	Previous bilateral trephining	7	2	71	19	1	0
2.	54	M	5 mos.	34	Chronic alcoholism. Closure central artery O.S.	2	3	49	38	8	0
3.	34	F	1 yr.	30.5	Asthma	7	2	55	33	3	0
4.	72	M	5 yrs.	56	Parkinsonian tremor	8	4	48	38	1	1
5.	54	M	8 yrs.	85		6	0	47	42	5	0
6.	42	F	3 yrs.	67	Iritis, O.S. 12 yrs. ago	10	4	61	24	1	0
7.	78	M	3 yrs.	40		6	6	57	30	1	0
8.	64	M	2 yrs.	28		5	8	69	15	3	0
9.	59	F	2 yrs.	30	Bilateral iritis 20 yrs. ago. Cardiac disease	6	6	65	22	0	1
10.	61	F	26 yrs.	40	Rheumatic with exoph. goiter	3	4	57	35	1	0
11.	33	M	2 yrs.	26	B.P. 210 mm. Hg	6	5	48	38	3	0
12.	53	F	24 yrs.	40	Hypertension	5	5	46	42	2	0
13.	71	F	8 yrs.	40	Chr. sinusitis. Hypertension, B.P. 200+mm. Hg.	3	5	60	31	1	0
14.	76	F	3 yrs.	29	Hypertension	5	1	62	28	4	0
15.	68	F	4 yrs.	50	Pernicious anemia 4 yrs.	6	3	47	41	3	0
16.	30	F	2 yrs.	34		8	8	55	26	3	0
17.	53	F	2 yrs.	30	"Nervous breakdown"	5	5	58	24	8	0
18.	75	F	1½ yrs.	34		4	2	58	35	0	1
19.	75	F	2½ yrs.	29	Hypertension	9	6	59	24	2	0
20.	70	F	19 yrs.	26		8	3	58	30	1	0
21.	77	F	2½ yrs.	23		5	6	54	33	2	0
22.	66	F	8 yrs.	34		10	2	49	34	5	0
23.	85	F	9 mos.	75	Arthritis	2	3	66	29	0	0
24.	58	F	1 yr.	29	Diabetes	4	0	63	31	2	0
25.	56	F	3 yrs.	22	O.S. Previously operated on for glaucoma. Sec. iritis	7	5	61	23	4	0
26.	43	M	2½ yrs.	70	Hay Fever	3	3	53	41	0	0
27.	63	M	1⅔ yrs.	65		13	7	57	19	2	2
28.	62	M	5 yrs.	40	C.N.S. lues	7	6	60	24	2	1
29.	67	F	2⅓ yrs.	28		5	4	73	17	1	0
30.	75	F	2 yrs.	70	Sinusitis, iritis, asthma	5	5	53	35	2	0
31.	54	M	12 yrs.	75		2	7	57	30	2	2
32.	67	M	3 yrs.	40		2	5	51	39	2	1
33.	56	M	1¾ yrs.	75		3	4	66	26	1	0
34.	60	F	11 yrs.	45		5	4	52	33	5	1
35.	78	F	9 yrs.	37	Cardiac disease	9	6	58	25	2	0
36.	62	F	9 yrs.	37	Sinusitis	6	3	46	44	1	0
37.	66	M	8½ yrs.	60		7	3	63	25	2	0
38.	70	F	1½ yrs.	34		8	7	60	20	5	0
39.	57	F	2½ yrs.	40		6	4	46	42	1	1
40.	75	F	1½ yrs.	25		6	9	62	21	0	2
41.	72	M	6 yrs.	50		8	2	55	26	8	1
42.	47	M	2 yrs.	25	Hay Fever	4	6	65	24	1	0
43.	47	M	1¼ yrs.	29		4	5	68	20	2	1
44.	58	M	8 yrs.	48	Silicosis. Ret. pigmentosis	10	0	71	16	3	0
45.	71	M	13½ yrs.	85	Cholesterin crystals in lens. Obesity. Hypertension.	10	1	83	5	1	0
46.	54	M	13 yrs.	75		8	4	53	27	7	1
47.	63	F	4 yrs.	75	Acute bilateral glaucoma	4	1	54	36	5	0

TABLE 1—*Continued*

Case No.	Age	Sex	Known Duration of Glaucoma	Highest Recorded Tension (Schiötz)	Complicating Conditions	Differential Blood Count (%)					
						Monos.	Non. Seg.	Seg.	Lymph.	Eos.	Bas.
48.	58	F	3½ yrs.	27	Hypertension	6	4	63	26	0	1
49.	41	M	1¼ yrs.	25		8	5	59	27	1	0
50.	58	M	1½ yrs.	29		11	2	62	23	2	0
51.	67	M	5 yrs.	40		5	5	57	32	1	0
52.	74	F	3½ yrs.	70	Essential atrophy iris, O.D.	9	3	68	16	3	1
53.	56	M	1¾ yrs.	29		7	4	57	29	3	0
54.	64	M	6 yrs.	60	Diabetes and retinitis	6	10	58	24	2	0
55.	63	M	2⅓ yrs.	60		6	2	52	36	4	0
56.	73	F	2½ yrs.	31½	Hypertension	4	2	64	30	0	0
57.	90	M	15 yrs.	65	Hemorrhagic glaucoma O.D.	3	2	83	12	0	0
58.	67	M	16 yrs.	60		11	3	57	25	4	0
59.	28	F	9 mos.	29		2	5	49	31	0	0
60.	37	M	10 yrs.	70		15	5	77	16	0	0
61.	46	F	3 yrs.	55	Bilateral iritis	7	7	43	41	2	0
62.	70	F	20 yrs.	34	"Psycho-neurosis." Ret. hemorrhage	10	8	71	11	0	0
63.	67	F	4 yrs.	37		1	5	62	32	0	0
64.	65	F	1 yr.	40	Arteriosclerosis. Rheumatism	13	6	48	30	3	0
65.	73	M	13 yrs.	38		5	5	72	16	2	0
66.	77	F	7 mos.	16		3	4	73	19	1	0
67.	62	F	3 yrs.	27	Albuminuria	12	9	54	21	2	2
68.	76	M	6 yrs.	55		3	4	67	23	1	2
69.	78	F	2½ yrs.	48		5	7	69	16	3	0
70.	57	F	2½ yrs.	31½		5	0	59	35	0	1
71.	59	F	2½ yrs.	46		8	4	60	26	2	0
72.	76	F	1½ yrs.	34		6	8	66	20	0	0
73.	67	F	4 yrs.	23½		9	8	62	19	2	0
74.	72	F	3 yrs.	75	Encephalitis-Parkinsonism. Thrombosis central vein retina	3	5	62	30	0	0
75.	61	F	4 yrs.	38		3	2	58	33	4	0
76.	59	F	1⅓ yrs.	40	Hyperthyroid	6	2	52	37	3	0
77.	54	F	9 yrs.	55	Encephalitis Parkinsonism	8	4	63	24	1	0
78.	70	F	2½ yrs.	31½	Arthritis	9	8	52	29	2	0
79.	59	M	16 yrs.	48		8	5	63	24	0	0
80.	69	F	10 mos.	65		7	3	43	45	2	0
81.	48	F	1½ yrs.	75		6	6	50	36	2	0
82.	71	F	1 yr.	31		8	6	55	30	1	0
83.	63	F	7 mos.	75		6	7	52	25	10	0
84.	76	F	8 mos.	40		6	0	61	31	2	0
85.	49	F	6 yrs.	25		4	3	44	49	0	0
86.	67	F	7 yrs.	30		5	3	68	22	0	2
87.	66	F	10 yrs.	100		5	3	42	46	4	0
88.	71	F	13 yrs.	55	Macular hemorrhage, O.D.	5	5	64	26	0	0
89.	38	F	1 yr.	34		8	1	58	31	2	0
90.	69	F	2 yrs.	25		1	5	76	18	0	0
91.	75	F	5 mos.	29		8	7	73	10	2	0
92.	59	F	3½ yrs.	48	Infected teeth	2	4	60	33	1	0
93.	76	F	3 yrs.			4	2	64	30	0	0
94.	61	F	1 yr.	34	Diabetes	3	0	58	33	6	0
95.	86	F	6 yrs.	80		8	3	59	28	1	1
96.	76	F	1½ yrs.	75		5	5	64	25	1	0
97.	82	F	7 mos.			2	0	85	13	0	0
98.	64	M	4½ yrs.	34	Diabetes	4	5	57	32	2	0
99.	61	F	4 yrs.	30		5	8	68	17	2	0
100.	55	F	1½ yrs.	60	Diabetes	7	8	57	27	0	1

glaucomatous process, the highest tension recorded by the Schiötz tonometer, the percentage of monocytes, and any known outspoken complications, such as diabetes, syphilis, and other conditions.

Discussion

As one can observe by inspection of the table, the ratio of female patients (67) to male patients (33) is 2:1. The age distribution is the usual one for glaucoma patients, 86 percent being 50 years old or older.

Inspection of the differential blood counts done on capillary blood taken from these 100 patients reveals the interesting fact that 94 percent of the patients had monocyte counts which fell within the normal range of 2 to 10 percent. The range of monocyte percentage was 2 to 15 percent, the six counts above 10 percent being distributed as follows: 11, 11, 12, 13, 13, 15 percent.

The differential counts were all done by one individual (J. C. L.), thereby eliminating the variable personal factor that is usually present when differential counts are made by several individuals. The blood films were all stained in the usual manner with Wright's stain.

One might ask why there is such a discrepancy between our findings and those of Massoud in Cairo, Egypt. It has long been known that the monocyte count may be elevated in protozoan infections. These types of infection are, of course, much more prevalent in Egypt than they are in our section of the world. This fact, we feel, casts considerable doubt upon the value of the monocyte count in the diagnosis of glaucoma in the East, and we now feel, as a result of our present study, that the monocyte count has absolutely no value in the diagnosis of glaucoma in our country.

Summary and Conclusions

1. A differential count was made on the blood of 100 consecutive unselected glaucomatous patients. 2. These blood films were stained with Wright's stain and a differential count was made by one individual. 3. The monocyte percentage ranged from 2 to 15 percent, 94 percent of the patients having monocyte counts within the normal range of 2 to 10 percent. 4. The monocyte count is of no value in the diagnosis of glaucoma.

THE LOCAL USE OF SULFANILAMIDE IN TRACHOMA

A PRELIMINARY REPORT

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There is a "trachoma belt" across the United States, described by Rice.[1] Northern Arkansas is within this belt. The records of the blind from trachoma receiving assistance through the State Department of Public Welfare indicate there are approximately three thousand cases in Arkansas. This paper is not intended to deal with the geographical distribution or to be a statistical study of trachoma in this state. These will make the subject of a future paper when the state has been fully surveyed.

A conference was held with Dr. Carl E. Rice, Surgeon, United States Public Health Service, in the spring of 1939, to determine the best method of controlling the trachoma problem in this state. Attending this conference were Commissioner of Public Welfare John R. Thompson, representatives of the state board of health, and the state supervising ophthalmologist. It was decided to conduct a trial clinic in the northern part of the state, the detail of procedure to be determined by the state supervising ophthalmologist.

Because of the lack of funds and the size of the district to be covered by the clinic, close supervision of each patient was not possible. The social status of the prospective patient being low, good cooperation could not be expected. For these reasons, it was decided that the large dosages of sulfanilamide used by Loe,[2] Gradle,[3] and Hirschfelder,[4] under the conditions with which we must cope, might have some unfavorable reaction. It was decided, therefore, to use very small doses of sulfanilamide, supplemented by local application of the drug.

The research analysis of Bellows and Chin[5] has shown that sulfanilamide appears in the tears within 15 minutes after its oral administration. This would lead to the presumption that the action of sulfanilamide on trachoma may be entirely local. Because of this, and to eliminate possible unfavorable reaction, it was decided in some cases to use only local therapy.

Clinics have been held in the northeastern and northern parts of the state.** Two hundred and six cases have been diagnosed as trachomatous. One hundred and sixteen of these have been under treatment and observation from three to five months. The following procedure was set up: The patients with no apparent physical disability which would contraindicate oral administration of sulfanilamide were thus treated. The dosage was 20 grains per day to an adult male, 15 grains to an adult female, and 10 grains to a child. In addition to this, an 0.8-percent solution of sulfanilamide was given to the patient to be dropped into the eyes four to six times per day. The patients who, for various reasons, were not considered good risks to treat orally with sulfanilamide, were given only the local treatment. The patients were all instructed to cleanse the eyes with warm water morning and night. No other medication was used. Each patient was given printed instructions to discontinue the tablets if any symptoms, such as

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** Assisting in these clinics were the following physicians: E. F. McCall, Lieut-Comdr. M.C., U.S.N.; and Drs. O. T. Cohen, M. E. Blanton, C. G. Hinkle, and Gaynelle Robertson.

nausea, rash, and the like, resulted, but to continue the drops. The results of these clinics are as follows:

Number of applicants for examination 902
Number of cases diagnosed as trachomatous 206

Included in the group diagnosed as trachomatous were only those persons manifesting the classical lid pathology associated with pannus, or cases in which a proved case of trachoma with pannus was present in the same family.

The cases were classified into four stages, as described by MacCallan.[6] The majority were found to be in the third stage (80) and fourth stage(62). Statistics of this are shown in table 1.

TABLE 1
CLASSIFICATION OF CASES AS TO STAGE OF TRACHOMA

Stage	Number of Cases
1	25
2	39
3	80
4	62

Ninety-seven patients were given oral and local treatment and 109 were given only local treatment. All of the patients receiving both forms of treatment reported a cessation of lacrimation and photophobia within the first three days. The patients on only local treatment reported the same relief of symptoms as those receiving oral medication.

Sixty-three patients who received oral medication were reëxamined and closely questioned regarding undesirable symptoms. Twenty-six reported some discomfort. The symptoms described are shown in table 2. At least one half of these patients discontinued the oral medication. This would increase the number of those who in reality received only local medication. No facilities were available for blood studies on these patients so that we cannot say whether or not there were any blood changes. No discomfort was reported by the patients who used only local treatment.

TABLE 2
UNDESIRABLE REACTION TO SULFANILAMIDE (ORAL)

Reaction	Number of Cases
Nausea	12
Rash	1
Constipation	2
Dizziness	7
Drowsiness	1
Weakness	2
Smothering	1
Total	26

The improvement in visual acuity obtained by treatment is probably the most satisfactory way of showing the results. The results in patients given oral and local medication would indicate that 46 percent after treatment had a visual acuity of 20/70 or better, and 19 percent were improved to 20/30 or better. Of the patients who received only local treatment 62 percent had a visual acuity of better than 20/70, and 31 percent improved to 20/30 vision or better. The stages of trachoma in the two groups were similar; thus it must be presumed that the greater percentage of improve-

TABLE 3
IMPROVEMENT IN VISUAL ACUITY (BY GROUPS) FOLLOWING SULFANILAMIDE THERAPY

From	To	Oral and Local	Local Only
20/30 or less	20/20	9	19
20/40 or less	20/30	14	11
20/50 or less	20/40	4	7
20/60 or less	20/50	8	11
20/80 or less	20/70	22	12
20/200 minus	20/200	35	22
Slight		26	19
None		2	5
Total		120	96

* Eyes blind from other causes were not included. Slight improvement includes from light perception or fingercounting to less than 20/200.

ment noted with local medication was not influenced by the stage of trachoma. It is probable that in a larger number of cases the percentages of improvement of vision would be more nearly equal. Statistics are shown in table 3.

It is realized that this is a small number of cases to prove definitely the results of local therapy, nor has the treatment been used over a sufficiently long period of time to determine whether or not there may be any recurrence of the infection, as described by Julianelle, Lane, and Whitted.[7]

Summary

The symptomatic relief of the patient with trachoma on local sulfanilamide is apparently as rapid and complete as that obtained from oral medication.

In 214 eyes, equal improvement of visual acuity was obtained with both oral and local treatment.

Small dosages of sulfanilamide supplemented by local application can be used in ambulatory clinics with the same results as are obtained from large dosages of the drug.

It may be possible to prevent the recurrence of trachoma after sulfanilamide therapy by the continued local use of sulfanilamide. Even if the treatment had to be used for the remainder of the patient's life, there would be no danger to his health.

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NOTES, CASES, INSTRUMENTS

A SELF-LUMINOUS PLACIDO DISC*

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Boston

A self-luminous Placido disc is a distinct advantage over the reflecting type, as it does not depend on the variable and relatively weak light from the window. Howard** described a disc, the illuminating system of which was a series of concentric neon tubes. Aside from the difficulty of manufacture, this has the disadvantage of necessitating breaks in the circles at the outlets of the neon tubes.

A much simpler and quite effective self-luminous disc can be made as follows: First obtain one of the new shaving mirrors that has a bulb behind, and a translucent ring about the mirror for illuminating the shaver's face. The one I used is made by the Nova Manufacture Company, Brooklyn, New York, and retails at $1.39 in Boston. The mirror and white paint should be scraped off the glass plate and nitric acid applied to make the plate as clean as possible. The glass plate is easily removed by detaching the flexible ring that holds it in place. The black-and-white concentric circles of the Placido disc may be painted on the glass plate directly, but I have found it satisfactory to paint black rings on a disc of white translucent cellulose acetate.† The disc of cellulose acetate is cut to equal in size the glass plate and is held in place by the metal ring over it. Kodalak is a suitable paint for the black rings, as it does not smudge when washed with water.

The use of the disc is very simple. Owing to its small size, it must be held closer to the patient's eye than is the case with the usual Placido disc. The objection that occurred to me before I actually tried it, and that occurs to practically everyone else at first, is that the observer looks from one side of the disc instead of through its center. With the non-luminous types of Placido disc as well as with Howard's model, the observer looks through a central aperture. But I have found this procedure quite unnecessary; in fact, it is disadvantageous in that it makes difficult the moving of the image

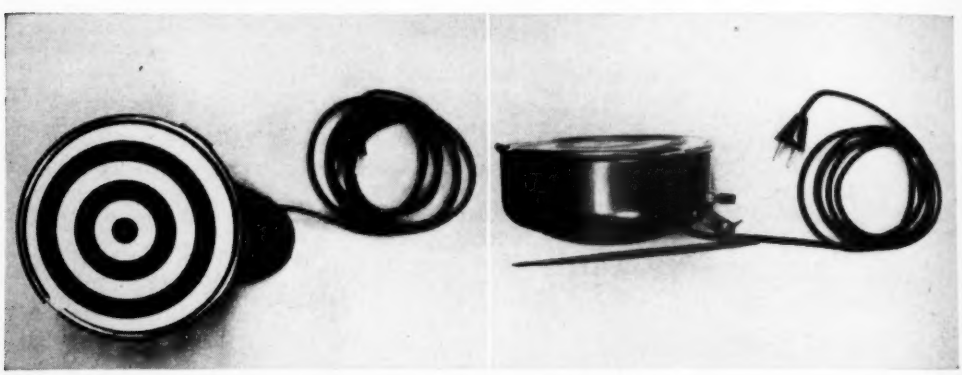

Fig. 1 (Cogan). Self-luminous Placido disc.

* From the Howe Laboratory of Ophthalmology, Harvard University, and the Massachusetts Eye and Ear Infirmary.

** Howard, W. H. A new keratoscope. Arch. of Ophth., 1936, v. 15, pp. 709-711.

† Obtainable at Landers Brothers Company, 145 Pearl Street, Boston.

over various parts of the cornea. When the observer looks from one side of the disc, it is not necessary to give the patient any instructions as to fixation. The position of the image may be easily varied by movement of the disc, movement of the observer's head, or movement of the patient's eye. The normal cornea, of course, shows no distortion of the image except in the region of the limbus.

243 Charles Street.

STATISTICS RELATING TO BLINDNESS*

CONRAD BERENS, M.D.
New York

The monograph, "The problems of statistics relating to blindness," by Harry Best, Ph.D., published in the American Journal of Ophthalmology for December, 1938, gives a much-needed emphasis to the importance of reliable statistics on blindness and the causes of blindness. I heartily concur in all that Doctor Best has to say as to the necessity for adequate data if we are to direct more wisely our efforts toward the prevention of blindness, or measure the results of those efforts.

Regarding the value of existing statistics, however, and particularly those compiled by the U.S. Bureau of the Census, I find that I am not in entire agreement with Doctor Best.**

In the 1920 census to which Doctor Best refers, the figures on causes of blindness were compiled from questionnaires filled in by the blind persons and therefore represent the cause reported by the blind individual. It is scarcely necessary to point out to ophthalmologists the wide margin of error thus made possible. The individual may never have had an eye examination and diagnosis by a competent ophthalmologist, may have misunderstood what the examining physician told him, or may have been unwilling to report the real cause of his eye defect even when he knew it (particularly in cases of venereal disease). Statistics thus compiled may be dangerously misleading.

Confidence in the Federal figures are justified by Doctor Best by comparing them with the data published by certain state agencies for the blind and by finding that the percentage distributions are similar. But it is unfortunately true that most of the figures that have so far been reported by state agencies are, like the census figures, largely compiled from statements of the blind themselves as to the causes of their blindness. They are subject to the same errors of lack of competent diagnosis, misunderstanding on the part of the patient, and unwillingness to admit the truth. Consequently, little more reliance can be placed on them than on the census figures, and the happy coincidence that two sets of data are not greatly at variance does little to increase the validity of either.

It is also apparent that even if the census data were accurate and representative, as Best holds, at the time they were collected (1920), they cannot be taken to give a true picture of the causes of blindness today. To assume that they do is to disregard the progress that has been made in the control of communicable disease (especially syphilis, gonorrhea, smallpox, measles, and allied conditions) which we believe to have decreased not only the incidence of these causes of eye pathology but also to have decreased the

* Aided by a grant from the Ophthalmological Foundation, Inc.

** It is to be recalled that no data on causes of blindness were collected in the 1930 census, because the Census Bureau was convinced of the unreliability of the cause data that could be secured by means of reports obtained from blind persons themselves.

severity of the damage done by them. In 1920, for example, the use of salvarsan had scarcely had time to be widely known, and its therapeutic effects cannot have been reflected in the blind population of that year. The control of smallpox was further advanced, but there were living in 1920 many blind persons, victims of smallpox in their youth, who have since died, and whose successors have never suffered from the disease. There is indisputable evidence that the incidence of many communicable diseases has decreased during the past 20 years, and therefore it may be presumed that the amount of blindness caused by them also has decreased.

It is an easily demonstrated fact that *no state agency* for the blind, with the exception of institutions for the education of blind children, has yet in its files adequate and reliable eye-examination reports for all blind persons in its area, or even for all the blind persons known to such agency. Some of the state agencies have in effect policies, as yet strictly adhered to in only a few states, which require ophthalmological reports for all persons receiving service from the agency, but no agency has so far attempted to extend this policy to cover all the blind persons on its register. Until this has been done we can place little reliance on the published statistics of blindness.

Such an aim, however, is not impossible of achievement. Since the Social Security Act became effective in February, 1936, those states which are receiving Federal funds for assistance to the needy blind have been required to secure for every recipient of such aid an adequate eye-examination report signed by an approved ophthalmologist. At the present time more than 60,000 such eye reports are on file in various states, and the number is steadily increasing. These records represent only one section of the blind population—those who are in financial need and can qualify for public assistance—and may not be representative of the blind group as a whole. Nevertheless, they constitute a first step, and when once the value of such data is recognized, the next step should be to extend the eye-report procedures to those blind persons who are not receiving financial assistance from public funds. While it may never be possible to secure an eye report for every blind person in the United States, it should eventually be possible to cover 90 to 95 percent of the blind population with such a service.

Ophthalmologists hold the key to reliable statistics of blindness. They alone are competent to determine the cause of blindness, and in some cases even the fact of blindness. Ophthalmologists are therefore urged to comply with the following suggestions designed to promote better statistics of blindness:

1. To use their influence to prevent the collection and publication of statistics on the incidence of blindness or causes of blindness which are not based on ophthalmological examination; and to refrain from quoting such figures (or to quote them only with qualifying statements.

2. To coöperate with the Committee on Statistics of the Blind* in its program for standardizing statistics on causes of blindness.

3. To improve their techniques in eye examinations and reporting.

4. To coöperate with all properly authorized agencies for the blind and for prevention of blindness by furnishing reports on eye conditions of patients on request of such agencies.

5. To promote the extension of facili-

* For information concerning the plan of classification developed by the Committee, apply to the secretary, Miss Evelyn C. McKay, 15 West Sixteenth Street, New York, N.Y.

ties for eye examinations and eye reports to include all blind persons in the community, not merely those in financial need.

These measures will result in increased knowledge of causes of blindness, both in local communities and for the nation as a whole, and in the gradual development of reliable statistical measurements of the progress of ophthalmology in preventing blindness.

35 East Seventieth Street.

ACUTE SEROUS TENONITIS*

HUGH C. DONAHUE, M.D.
Boston

An analysis of any series of cases of exophthalmos reveals that in a very definite but small percentage, the causative factor is quite difficult to determine. In a small proportion of these cases the reason for the exophthalmos is due to pathology in Tenon's capsule; because of this reason, and also because of the rarity and interest of the condition itself, it was thought that a report of such a case would be of value.

Abnormalities of Tenon's capsule are rare. Only eight cases have been listed in the Massachusetts Eye and Ear Infirmary since the record room began functioning in 1922. A careful review of the literature of the world of the past 15 years contains only 24 cases of this condition and in one article, dated 1926, it was stated that at that time, only 40 cases of this condition had been reported in the entire ophthalmological literature. It is obvious, then, both from the records of this hospital and from a perusal of the world literature, that this condition is exceedingly rare and therefore of interest.

Anatomy. The capsule of Tenon is recognized at the 80-mm. stage of embryonic life as a sheet of mesodermal condensation, associated with the insertion of the recti muscles. In the fully developed eye it is a thin, fibrous membrane fused with the attachment of the bulbar conjunctiva, which envelops the scleral portion of the globe, terminating behind at the exit of the optic nerve; its inner surface is well defined and connected with the sclera by fine trabeculae that are in close contact with it and that are pierced by all structures entering or leaving the eye. It is also fused with the sheaths of the extraocular muscles. The opposing surfaces of the sclera and Tenon's capsule are held to be lined with endothelium, the capsule of Tenon thus forming an articular socket in which the eyeball moves freely in all directions. The capsule is attached to the globe in front, to the ocular muscles, and to the sclera by the above-mentioned trabeculae, and it seems probable, therefore, that while slight movements take place between the globe and the capsule, in more extensive movements the globe and the capsule move together in the surrounding fat. This is evident in inflammation of the capsule wherein all movements of the eyeball become restricted.

The lower part of the capsule of Tenon thickens to form a sling or a hammock on which the eyeball rests, and has received the name of ligament of Lockwood; its effectiveness in supporting the eyeball is shown by the fact that the globe does not sink down after the removal of the superior maxilla. Tenon's capsule is reflected backward to a varying degree upon each extrinsic eye muscle and sends slips or expansions to the surrounding structure; these expansions are strong and to some extent limit the actions of the muscles and are called check ligaments. In the cases of the superior and

* Read before the Massachusetts Eye and Ear Infirmary Alumni Association, November 15, 1939.

inferior recti muscles, these ligaments enhance the motion of the upper and lower lids and aid as well in the movement of the eyeball.

Pathogenesis. The most common type of pathology occurring in this tissue is inflammation, either of the serous or purulent type. Such inflammatory processes are due, in practically every case, to extension of infection from some other part of the body. Infection of Tenon's capsule is never primary. A review of etiological factors of the reported cases shows an equal distribution, as far as etiology is concerned, between gout, rheumatic fever, and influenza. Isolated cases following orbital abscess, uveitis, parotitis, infected teeth, and corneal ulceration are reported. One South American author even stated that the condition was due to hypofunction of the hypophysis. In the eight cases reported from this hospital, three were said to be of rheumatic origin, one followed an exacerbation of a chronic prostatitis, one was traced to chronically infected tonsils, while in the remainder no etiological factor was given.

Bacteriology. In none of the reported cases were offending organisms described, although examinations of both cultures and tissue was made. It is apparent, therefore, both from the reported cases and as demonstrated in my cases, that this clinical entity is practically always secondary to pathology elsewhere.

Course. The onset of the condition is usually gradual and is accompanied by a transient edema of the bulbar conjunctiva and pain upon extreme rotation of the eyeball. In mild cases, the edema may last only a few days and disappear. Recurrence may then take place and the edema frequently alternates from one eye to the other and is practically never unilateral. In prolonged cases, the interval between attacks becomes shorter, and finally there is tremendous chemosis of the conjunctiva with edema of the lids and proptosis of the eyeballs. The exophthalmos is straight ahead with limitation of motion in all directions and extreme pain upon movement of the eyeball. Infrequently there occurs some intraocular evidence of inflammation, but more often not. The pupils, media, and fundi are usually normal with no disturbance in visual acuity. Some papillitis has been reported, but this condition is probably due to venous stasis from the abnormal position of the globe. There is seldom any fever or leukocytosis.

In *diagnosis,* the condition may be confused with orbital cellulitis, with cavernous-sinus thrombosis, panophthalmitis, trichinosis, neurofibromatosis, and scleritis periodica fugax. Most of these conditions are accompanied by systemic signs and symptoms such as hyperpyrexia, increased white blood count, and prostration, which are absent in acute serous tenonitis.

The amount of chemosis present in this condition is probably greater than in any other disease of the eye. Milder forms of tenonitis, however, probably still remain undiagnosed.

The *treatment* of tenonitis is difficult partly because the disease is recalcitrant to all forms of therapy and partly, as has been said, because the etiology is obscure; any metabolic or rheumatic disturbance should be investigated and, if present, proper treatment should be instigated. The question of allergy might be considered, especially a sensitivity to tuberculoprotein, which affects the neighboring sclera rather commonly; foci of infection should be inquired into and eliminated. Protein shock, diaphoresis, salicylates, sulfanilamide therapy have all been employed with varying, but usually little success. In cases of serous inflammation, X-ray therapy, theoretically, should have little effect; however, in the two cases that I have observed it was followed by a cure. Success in treatment is dependent

on general measures, and local treatment to the eye makes little impression.

Case Report

This is a case of a 43-year-old, American housewife whom I first examined on February 6, 1938. Eleven weeks previously, the patient had had a cold, a sore throat, and a "grippy" feeling that was characterized by muscle pains and aches in the arms and legs. She remained in bed a few days at that time and two weeks thereafter developed pain in the left eye, which became swollen and prominent. This swelling of the eye had become progressive, accompanied by some dull and occasionally sharp orbital pains. There had been no blurring of vision and no diplopia. Approximately at the time of the onset of trouble in the left eye, the patient noticed some swelling of the right eye, but this was much less pronounced until two weeks previously, when it became very marked and, because of the tremendous amount of swelling of both eyes, she consulted her local physician.

A basal-metabolism test was made at her local hospital and the result was reported to have been slightly above normal. The patient remained under treatment of her local physician for several days with no improvement in her eye condition. My examination of the eyes, February 6, 1938, revealed a tremendous amount of edema of the lids with massive chemosis of the bulbar conjunctiva. Both eyes were markedly proptosed, the right eye measuring 28 mm. upon the Hertel exophthalmometer, and the left eye, 24 mm. There was marked limitation of motion in all directions, the eyes being practically fixed in the primary position. Vision was normal in both eyes. The pupils were normal, the media clear, and the fundi normal.

The patient was hospitalized and complete clinical and laboratory studies were made. She had no fever, and the white blood count at no time was higher than 10,000 and more often in the region of 5,000 or 6,000 with normal smear. X rays of the orbit, sella turica, sinuses, skull, and teeth were negative. Blood Wassermann, and Hinton tests were

Fig. 1 (Donahue). Acute serous tenonitis.

negative. After consideration of other negative clinical and laboratory findings, a diagnosis of tenonitis was made. The patient remained under my care in this hospital for nine weeks. She was first treated with sulfanilamide, receiving sufficient dosage to maintain a definite blood concentration, then being carried upon a maintenance dosage for 14 days. No improvement took place. We then treated her empirically and started with foreign-protein therapy. She received 20,000 units of diphtheria antitoxin daily for six doses. No change in the ocular condition took place. Following this, treatment with salicylates was begun. The patient received 60 gr. of sodium salicylate accompanied by 45 gr. of sodium bicarbonate daily for one week, with the condition remaining at a standstill. In addition to this, local treatment to the eyes consisted of applications of antiseptics, mydriatics, and bland ointments to prevent exposure changes. Following a period of five weeks of treatment, the condition remained approximately the same. Then it occurred to me that perhaps some X-ray therapy might be advisable on account of the con-

sistently low white count and probable lymphocytic infiltration. The patient was accordingly sent to the X-ray Department, where she received a very mild dosage of 200 R. One day following this treatment, the chemosis and exophthalmos began to recede. One week later, the patient was given another dosage of X rays of less intensity and with added effect upon the convalescence. During the next three weeks, the chemosis and proptosis gradually receded to the extent that it was thought proper to let the patient go home. This was at the beginning of the ninth week. There was still a slight amount of chemosis present but the eyes were otherwise normal.

Three months later, when the patient was seen in my office, both eyes were normal.

During the past month, another case of acute serous tenonitis has come under my care and has responded to X-ray treatment within 36 hours.

The above-described case demonstrates the course of a very stubborn and unyielding inflammatory process in Tenon's capsule which finally was relieved by mild X-ray therapy.

520 Commonwealth Avenue.

THE TRONCOSO MAGNESIUM IMPLANT AND THE SETON OPERATION USED ON THE SAME PATIENT

OTIS WOLFE, M.D.
AND
RUSSELL M. WOLFE, M.D.
Marshalltown, Iowa

The following case record is given as a preliminary report so that comparisons may be made of two surgical procedures for glaucoma that were presented by Dr. Uribe Troncoso before the Section on Ophthalmology at the 1939 meeting of the American Medical Association with a discussion of Dr. Troncoso's paper by one of us (O. W.).

A white woman, aged 73 years, in fairly good health, reported that in 1932 her vision had begun to fail, coincident with the onset of severe headaches which radiated from the eyes. She consulted an oculist, who made a diagnosis of glaucoma and told her that the right eye was in very poor condition but that he probably could save the left. Drops were used off and on but not regularly except when the eyes pained. In 1937 the left eye began to fail rapidly and gradually lost vision. When the patient came to us she said that there had been no light sensation in either eye for two months. The ocular symptoms varied from discomfort to severe headaches and pain around the eyes. Tension was 45 mm. Hg (Schiötz) in both eyes. The pupil showed no reaction whatever to light or in accommodation. There was a fine circumcorneal injection and the cornea was just slightly hazy when viewed with the slitlamp. The pupils were 1½ mm. in diameter and absolutely fixed. Under 2-percent pilocarpine medication the intraocular tension was unaffected, but when pilocarpine was combined with 1-percent eserine and administered every three hours, the tension in the right eye was reduced to 38 and in the left to 33 mm. When the drugs were used in weaker solutions the tension rose rapidly. Surgery was advised.

The two procedures were performed simultaneously on both eyes. On the right eye our through-and-through seton was placed according to the technique previously described (Amer. Jour. Ophth., 1936, v. 19, May). A small sclerotomy was made with a Holth punch where the seton protruded through on the nasal side of the limbus. In the left eye a Troncoso metal implant was used

following the technique described by that author. Twenty-four hours after the surgery was performed, both eyes were clear. On the second day, when they were dressed, there was blood in the anterior chamber of the left eye and the eye was somewhat painful. Relief was obtained by salicylates. Three days after the operation an air bubble was first noted in the anterior chamber of this eye. There was a hematoma under the conjunctival flap. From then on the postoperative course in both eyes was uneventful, but the right eye was more comfortable, had less operative reaction, and made the more rapid recovery. The seton was left a little long and had to be snipped off where it protruded from beneath the conjunctiva. (When this occurs it is irritating. This has been the only unfavorable symptom we have had in any of these cases. The conjunctiva should always be closed by a water-tight suture.)

In the left eye the air bubble increased in size until it filled the anterior chamber and there was a small amount of hemorrhage in the anterior chamber working down from under the implant. This gradually became absorbed and the patient was dismissed, just four weeks following her admission to the hospital, with both eyes clear and free from pain.

The case will be followed and a further report made as to the ultimate result. At this time the comment is made that both procedures were equally advantageous in obtaining reduced tension. The Troncoso implant caused slightly more irritation but this was probably due to the bleeding. Otherwise, it is no more difficult and would seem to give a prolonged cyclodialysis. We share the opinion of most ophthalmologists that cyclodialysis is one of the best possible surgical procedures for glaucoma surgery if a way can be found to prolong it. Our impression is that the Troncoso operation will do this and have a great field of usefulness, but that the seton technique still compares favorably with it.

SOCIETY PROCEEDINGS

Edited by Dr. Rommel Hildreth

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on ophthalmology

April 20, 1939

Dr. Alexander G. Fewell, *chairman*

Chevalier Taylor and his works in the library of the college

Dr. Burton Chance said that the library has received in recent years additions to the collection of Chevalier Taylor's works possessed by the college. This is a brief sketch of the professional course of that famous quack oculist who in the 18th century toured all the countries of Europe for 50 years, operating on cataracts, treating squinting eyes, and dispensing infallible salves and lotions.

In the "Treatise on cataract and glaucoma," we learn that Taylor couched cataracts, and that occasionally when the lens was dislodged into the anterior chamber during couching he might have removed it *in toto*, yet Taylor cannot be credited with deliberate extraction by Daviel's and others' procedures. We are justified in rejecting any statements of the "Ophthalmiator to the Pope and to Kings and Princes" that he cured squints by exact tenotomy. Certain competent surgical practitioners who had been invited by Taylor to witness his seances reported his procedures as fraudulent, and his accounts of his methods as ineffective.

Taylor was a bombastic charlatan who possessed sound knowledge, yet he was unique among the peripatetic operators in that he was not ignorant, and had he not been an otherwise untrustworthy itinerant his exposition of the physiology of the eye and optics might have been accepted. His works deserve attention; the originals we may believe were written by Taylor and were duplicated in many languages by employed translators; the number of his works Taylor recorded as over 50.

Of special note in our lot is an Atlas in Latin and German depicting 243 diseased globes—one picturing what is believed to be the first drawing of a conical cornea.

Three fine engraved portraits of the Chevalier are among the treasures of the college; these show how intelligent and attractive a man Taylor was. He was the last of the tribe which had flourished for quite a hundred years. His practice—in so many ways approaching scientific comprehension—led qualified men to investigate ophthalmological problems, hitherto deemed by the regular profession as unworthy of their consideration, thereby influencing the dawn of modern scientific ophthalmology.

The analysis of operative results in concomitant convergent strabismus

Dr. Glen C. Gibson stated that 66 patients were operated on for concomitant convergent strabismus. Forty-four had a bilateral recession of the internal recti and 22 had a unilateral recession of the internal rectus of an eye combined with a recession of the external rectus of the same eye.

The preoperative, operative, and postoperative results were compared and analyzed, and the following conclusions were made:

1. Graduated and definite amounts of corrections are indicated in the various degrees of strabismus, in the absence of any good reasons to the contrary.

2. The main good reasons to the contrary are:

(a) Youth, that is, absence of contractures, hypertrophy, and atrophy of the muscles.
(b) Unusually excessive or diminished muscular action as shown by the rotation test.
(c) The presence of the various congenital defects.
(d) Eyes which have had previous muscle surgery.

3. There are two main causes for unsatisfactory results:

(a) Under- and overcorrection.
(b) Failure to select the proper procedure for the given case.

4. No statistical confirmation was available which suggested that the recession-resection technique is more applicable to cases of amblyopic eyes than is the bilateral-recession procedure.

5. Bilateral recession is ideally applied to young individuals, with grades one and two strabismus, in which the rotations shows bilateral equal excess of the interni, associated with fairly normal externi.

6. Recession and resection is most applicable to cases in which there is unilateral preponderance of the muscle abnormalities, and for grades three and four strabismus. It is the method of choice in most cases.

7. The surgical procedure should be directed towards the muscles that are primarily at fault and in proportion to the amount of the over- or underaction of the muscles as demonstrated by the rotation test.

Discussion. Dr. H. Maxwell Langdon said one point to be considered, which was not brought out in Dr. Gibson's paper, is the difference between the amount of convergence at distance and near fixation. This, he believes, frequently will help in deciding whether recession should be done as well as an advancement. Recently he operated on a lad of 12 years who had a convergence of 20 degrees at infinity and 35 degrees for near. He performed an advancement operation of the external rectus and a recession of the internal rectus of the right eye. The result was 6 degrees of exophoria at infinity and orthophoria at 33 cm. The patient already had normal vision in each eye and good stereoscopic vision. Had he not performed the recession, he is quite sure he would not have obtained the result he did, and it was the difference of convergence between distance and near that proved to him that the recession was needed.

Hemeralopia, dark-adaptation, and glaucoma

Dr. Jacob B. Feldman called attention to the presence, but none too frequent association, of night blindness in patients suffering with renal calculi, glandular and liver diseases. Cure is effected in a moderately reasonable period. However, even in such simple cases the treatment may sometimes be prolonged before the hemeralopia is overcome. The chart upon which the dark adaption is plotted he described, so that one can readily separate the rod from the cone adaptations. Hemeralopia bears no relation to the intensity of pathology of dark adaption. He then discussed the treatment of hemeralopia and avitaminosis A, and the association of high blood cholesterol in the few cases of glaucoma examined. It is possible that pathologic dark adaption may be found of value as an indication in evaluating a phase of faulty liver metabolism.

Discussion. Dr. Robb McDonald said he had been interested in the problem of dark adaptation for some time and had tested a number of patients using the adaptometer devised by Dr. Hecht. He believes that many workers in testing the light sense are apt to forget the normal physiology of the retina. We all know that in the light-adapted state, what we

term "visual acuity" is maximum at the fovea and decreases abruptly if one shifts his gaze from fixation. The reverse holds for the dark-adapted state, the fovea is blind and the sensitivity of the retina to a flash of light increases just as abruptly if the test flash moves away from the fovea towards the periphery.

In his hands the testing of light sense is at times considerably more difficult to carry out and to evaluate than is ordinary qualitative perimetry, due chiefly to the fact that one is working in the dark and cannot see the patient. Poor fixation on the patient's part may give very high threshold readings. If a high threshold is obtained in one test he does not feel that he is justified in giving the patient some vitamin-A concentrate, and then on the second examination, if there is improvement, to state that the patient had been deficient in vitamin A. Patients improve greatly with practice in this type of examination; if given 1 mg. of aqueous carotene intramuscularly the effect is usually very rapid. He has done this during the dark-adaptation test on patients with known vitamin-A deficiency and has noticed an almost immediate or significant response (lowering of threshold).

He has not tested many glaucoma patients, but in the few he has tested, if the test flash falls on a nonscotomatous area of the retina, the final threshold has been within normal limits. Glaucoma produces typical fiber-bundle defects in the visual field, and he believes that the taking of visual fields is a much more accurate method of diagnosis and of following the course of the disease.

We must remember dark adaptation is a physiological process, which goes on for hours. It takes at least 20 to 30 minutes to obtain threshold readings that are fairly consistent. This factor plus the technical difficulties of working in the dark and the maintenance of fixation add to the complexity of the test. In trained observers it is a relatively simple test, but on the average run of hospital patients we must have very well-controlled observations before considering the patients to have faulty dark adaptation.

The clinical value of the horizontal plane of the eyes

Dr. S. Weir Newmayer presented a preliminary report on a study of over 5,000 school children ranging in age from 6 to 16 years. Cases were referred for possible eye defects as a causative factor in preventing efficient reading. Failure to learn to read was due to: 1. Faulty teaching technique. 2. Physical defects, congenital or acquired, of the visual apparatus. His paper did not detail findings of ametropia, pathology of the media of the visual apparatus, or heterophorias. The abnormalities of horizontal plane he considered as oblique twistings or torsions in one or both eyeballs from a normal horizontal line, occasioned by abnormal development of skull and orbits with an asymmetry of skull. The change of plane causes changes in the center of rotation and center of optic axis, and a resulting failure to provide binocular fusion at reading distances. Some types of these abnormal planes are compensated for by tilting the head and acquiring a suitable plane of vision. Most cases demand suppression of vision in one eye. Visual confusion and mistakes in recognizing certain letters in print are diagnostic in many cases.

The incidence of abnormal planes of poor readers among 5,000 cases, in all grades, was 15 percent; among 600 children in the first grade, and with poor reading achievement, it was 40 percent; and among 600 children in upper grades, fifth and sixth, but not grouped on read-

ing achievement, it was 37 percent. The percentage of abnormalities was greater in the colored race.

Discussion. Dr. Alfred Cowan said that Dr. Newmayer's discussion has been very interesting from the physiological standpoint. He should like to know how he arrived at his conclusion regarding the obliquity of the plane; whether he started from the horizontal, or if he considered the palpebral fissures as being important to determine the plane of the visual lines. Patients with slanting palpebral fissures do not necessarily have visual axes that conform to the shape of the aperture. He should like to know, also, if the visual acuity of these children was taken into consideration and if they were carefully refracted and vision corrected before these tests were made.

Dr. Newmayer in conclusion said the 5,000 cases received a complete eye examination. Full and normal vision in both eyes does not assure binocular fusion, irrespective of cause of lack of fusion. The presence of an abnormal horizontal plane, signs of reading deficiency, and our knowledge of physiological optics should be presumptive evidence that this abnormality is a causative factor.

Warren S. Reese,
Clerk.

CHICAGO OPHTHALMOLOGICAL SOCIETY

April 17, 1939

Dr. Georgiana D. Theobald, *president*

Aniridia and cataract following trauma

Dr. Edward J. Horick presented a woman, aged 54 years, who, while playing with her pet dog, was struck in the right eye with the animal's paw. She was wearing rimless, octagon glasses. She felt a sharp pain in the eye, and when she wiped it, something black came away on her handkerchief.

She was examined within a half hour. The right eyelids were uninjured. At the 12:00-o'clock position, 2 mm. above the limbus, was a diamond-shaped hole with a black floor. The eye was very soft and the anterior chamber was filled with blood. Within two hours the defect in the sclera was covered with a conjunctival flap. Recovery was uneventful and without pain. The blood became absorbed rapidly from the anterior chamber, and the eye soon became white.

There remains an eye with aniridia and complete cataract with no dislocation of the lens. Light projection and perception are unimpaired. Using reflected light, the lens is seen to be opaque, and many of the zonular suspending fibers can be discerned. There is complete absence of the iris and the serrations of the ciliary body are clearly visible.

Ectopia lentis with arachnodactyly

Dr. C. D. Lenz said that this boy, aged 13 years, first seen one year ago, complained of poor vision. Each eye had 20/40 vision uncorrected, both eyes improving to 20/20, the correction being R.E. -2.75 D.sph. $\bigcirc\!\!\!-$ $+1.50$ D.cyl. ax. 112°; L.E. -2.75 D.sph. $\bigcirc\!\!\!-$ $+2.00$ D. cyl. ax. 77°. The near point was 19 cm. for each eye. No pathology was found until the pupils, dilated under atropine, revealed a 2-mm. bilateral dislocation of each lens superiorly. The fundi were negative. A check-up two days ago showed a reduction of vision in the right eye to 20/65; in the left to 20/50 (with glasses). The lens of the right eye was now dislocated more nasalward, but in the left eye the lens had dropped back into place so that one could barely see that it is dislocated. However, both lenses were suffi-

ciently twisted on their axes so that skiascopy was unsatisfactory.

This boy has long, spidery fingers and long, narrow feet (arachnodactylia), as has his sister. Their father also had long narrow fingers and serious eye trouble

The sister, aged 26 years, was shown as a more obscure type of ocular defect associated with arachnodactylia. She received glasses following a homatropine refraction at the Illinois Eye and Ear Infirmary one year ago and is wearing a plano lens over the right eye which has 20/20 vision, while a lens, −0.75 D.sph. ⌯ + 2.00 D.cyl. ax. 90°, gives the left eye 20/25 vision. The near point fluctuates from 14 to 25 cm. No dislocated lenses nor other pathology was found one year ago. She has complained consistently of pain, especially in the right eye, and of decreased vision on dark days, but no signs of increased intraocular pressure nor of inflammatory changes have been found. When seen at the Research Hospital, under slitlamp examination, multiple scattered pale blue punctate lens opacities, typical of cerulean cataracts were found. She has shown no signs of ectopia lentis at any time.

Discussion. Dr. Roy O. Riser said that in addition to the moderately ectopic lenses of this boy it had been hoped to show a very severe case in a girl from down state, but in her absence colored photos were shown of the dislocated lens and the view of the arachnodactylia she presented. There was no doubt of the diagnosis of Marfan's syndrome. The entire subject had been reviewed by C. C. Clarke in the January, 1939, number of the Archives of Ophthalmology. He states, in his summary, that ectopia lentis, synonomous with congenital dislocated lens, is defined as a dislocation of the ocular lens, of greater or less degree, based on a developmental anomaly, and pathognomonic of ectopia lentis or poorly developed ciliary body and ciliary processes. Grade III in his anatomico-clinical classification combines ectopia lentis with anomalies of ocular structure, and grade IV includes anomalies of constitution; that is, aberrancies of body development, such as arachnodactylia. Grade III definitely includes the cerulean cataract described in the sister of the boy presented (Clarke having listed 1 case in 31 reported). It is felt that the weak and inconstant accommodation in this patient's case is also subject to inclusion under the field of poorly developed ciliary muscles, and the attachments of the zonular fibers, even though she has never shown actual ectopia lentis. Burch found ectopia lentis in 50 percent of patients with the long spidery fingers and long narrow feet of arachnodactylia. One should remember the border-line cases of zonular and ciliary underdevelopment that may be potential cases of ectopia lentis, becoming manifest after a bump or fall.

Atypical conical cornea and interstitial keratitis

Dr. Martha Rubin Folk said that R. H., a woman aged 27 years, was first seen on November 4, 1938. She presented the following history: At the age of 10 years, diagnosis was made of interstitial keratitis. She was under treatment and observation for three years. The vision became worse with each pregnancy. The family history is negative. The patient had gonococcic salpingitis six years ago, and a salpingectomy was performed.

At the present time she complains of blurring of vision, marked photophobia, and occasional pain around the eyes. The vision has been gradually getting worse.

On examination both eyes were quite prominent, with the appearance of buphthalmus. Vision O.D. 5/200; O.S. 2/200. Ocular movements and tactile tension

were normal; the corneae measured 13 mm. in diameter, bulged forward, and were globular in shape. The corneae presented diffuse grayish opacities interlacing in different directions. A pannus 3 mm. wide was found in the upper fifth of the left cornea. This was much denser than the rest of the opacities. There were numerous diffuse and cloudy areas scattered throughout the cornea with clear spots between. The sensitivity of both corneae was decreased. The anterior chambers were deeper than normal. Irides were grayish-blue and appeared somewhat magnified and tremulous. Pupils were 5 mm. in diameter and reacted sluggishly to light. Vitreous floaters were present. Discs and retinal vessels were normal. The keratometer showed in the right eye an astigmatism of 9.5 D.cyl. ax. 45°. The left eye showed a greater amount and could not be measured.

Slitlamp examination revealed numerous vessels underneath the corneal epithelium. In the nasal quadrant of the stroma was found a diffuse and cloudy triangular area that had a chalky white border. Descemet's membrane was intact.

Laboratory findings were essentially negative.

Treatment has included pilocarpine 2 percent, one drop three times daily, and calcium gluconate. Homatropine refraction was unsatisfactory; manifest refraction showed O.D. −6.50 D.sph. ⌯ −7.50 D.cyl. ax. 60° with vision 0.6, O.S. −2.00 D.sph. ⌯ −7.00 D.cyl. ax. 165° with vision 0.4. Contact lenses were considered but were not used because of the interstitial keratitis.

Keratoconus

Dr. Hallard Beard showed a man, aged 20 years, who had noticed a progressive indistinctness of vision in both eyes for the past six years. Vision O.D. 4/200, with correction (−1.00 D.sph. ⌯ −2.00 D.cyl. ax. 5°) vision 0.1; O.S. 4/200, with correction (−2.00 D.sph. ⌯ −1.75 D.cyl. ax. 165°) vision 0.3. Pupils and eyegrounds were normal, although the latter were not seen clearly. Corneae were clear though they presented a curvature so sharp as to be beyond the range of the keratometer to measure more than 52. D. The increased curvature was limited to the central portion, the periphery being conical. The aberration interfered with a view of the fundus. The slitlamp showed no opacities, no Fleischer's ring, and no perceptible thinning of the cornea. The referring physician had made a tentative diagnosis of lenticonus, a condition not as yet definitely ruled out, since the distortion of the fundus appeared somewhat out of proportion to the amount of corneal aberration.

Hyaloid remnant or congenital cyst of vitreous

Dr. Walter Ackerman presented A. S., a woman aged 55 years, seen at Mandel Clinic, Michael Reese Hospital, on March 13, 1939, with the complaint of seeing a "spot" before the right eye for a period of one week. Vision O.D. was 20/200, O.S. 20/20 with correction. The anterior segments of both eyes were essentially negative. Fundus examination showed behind the opening of the ophthalmoscope a vertically oval hyalinlike pitted body in the vitreous just below the level of the disc, in a position usually occupied by the hyaloid canal. This vitreous body was approximately equal to the disc diameter in height and one third the disc diameter in width. It appeared to be fixed in the vitreous on rotation of the eyeball. No pigment was seen on its outer walls. It could not be seen with the slitlamp. Examination with the slitlamp showed no abnormalities of lens or vitreous. The left eye was essentially negative.

The vitreous body was believed to be

either a remnant of the hyaloid artery or a congenital vitreous cyst which, according to Cassady is believed to have its origin from degenerated hyaloid elements in the primary vitreous.

In this present case no pigment was seen. It was, however, difficult to say from ophthalmoscopic examination whether the body was solid or whether it contained fluid.

Retrobulbar neuritis, descending optic-nerve atrophy (right eye), multiple sclerosis

Dr. S. Kaufman said that this patient was 35 years of age when he first came under observation in July, 1931. His complaint at that time was that one week previously he suddenly noticed that the sight in the right eye had begun to fail. He stated that the affected right eye was previously the better of the two. He complained of a dull pain in the region of the right orbit when moving the eyes.

Examination showed vision O.D. with +0.50 D.sph. ⊂⊃ + 0.25 D.cyl. ax. 75°, to be 20/50; O.S. with −0.25 D.sph. ⊂⊃ −2.25 D.cyl. ax. 15°, to be 20/30. Visual acuity for near, right eye, was decidedly reduced so that small print on the Snellen card could not be read, and the medium largest print could be read only with difficulty. Except for a triangular area of medullated fibers appearing over the upper temporal quadrant of the papilla margin nothing abnormal was noted in the affected right eyeball. Ocular movements were normal except for some pain on extreme rotation; conjunctiva, pupils, media, and fundus were normal. The visual fields revealed a normal blind spot and a peripheral field of normal limits. The study of the central fields, however, revealed a pericentral scotoma, irregularly circular in outline, rather dense for form, red, and green but normal for blue. The scotoma extended from the point of fixation to about 8 degrees temporally, above, and below, and 5 degrees nasally. The left eye was normal.

The patient was hospitalized and after a thorough medical and neurologic examination, and serologic tests, nothing of importance was found except for infected tonsils, pyorrhea, and haziness of the sphenoidal sinus. Blood and spinal-fluid Wassermann tests were negative. Removal of the tonsils, exenteration of the ethmoid and sphenoid sinuses did not affect the course. Except for transient improvement of sight and slight variation in the form and intensity of the scotoma, central vision progressively became poorer. About a year and a half after the onset a decided pallor of the right papilla was evident.

In November, 1933, a neurologic examination revealed nystagmoid jerking of the eyes, tremor of both upper extremities, marked exaggeration of all deep reflexes and ankle-clonus.

The interesting feature in this case is that the ocular symptoms antedated the other symptoms by more than two years. Visual disturbance is frequently an early and single symptom of multiple sclerosis and may dominate the picture for some time before other symptoms appear.

Orbital cellulitis with abscess formation

Dr. Philip A. Halper said that Baby L. A. C. was born September 22, 1938, and that on November 6, 1938, the parents noticed a slight swelling and redness of the right upper eyelid. There was some conjunctival secretion and the infant was treated for conjunctivitis. He was brought in on November 10, 1938, with moderately severe exophthalmos and a moderate amount of conjunctival secretion.

The baby did not appear to be acutely ill, and in spite of the short history and

sudden onset, the possibility of a tumor was considered. There was no evidence of infection in the nose or sinuses. The mother had had a suppuration of her finger with which she might have infected the baby in caring for him.

The patient was hospitalized on November 10th and X-ray studies showed

Fig. 1 (Halper). Infant at six months, showing proptosis of right eye.

only soft-tissue swelling. There was no bone destruction. On the basis of orbital cellulitis, X-ray treatments were given (one-third erythema dose for two successive days). On the third day there was extreme swelling and tension of the tissues, most marked in the lower lid. A needle was inserted and pus found at a considerable depth. Generous drainage was made and recovery was uneventful.

On January 3d, there was still mild lymphstasis in the lower conjunctival sac, which has since disappeared. Extraocular movements are normal and the fundus shows no abnormality.

Hypoparathyroid cataract

Dr. Louis Bothman read a paper on this subject.

Discussion. Dr. Robert von der Heydt thought there had been some confusion in reference to possible thyroid and hypoparathyroid cataracts. Lesions of the thyroid do not create a cataract. The cataract under discussion was ably presented except the series of pictures. Only two represented that which may be a typical tetany cataract. There might be an accidental removal of the parathyroids during thyroidectomy or a tying off of their blood supply. This might produce a tetany cataract. Tetany-type cataracts found in children are convulsion or rachitic cataracts. These when discovered present newly developed subcapsular clear fibers around the lamellar, zonular, or perinuclear involvement.

The characteristic picture of parathyroid-deficiency cataract, as seen with the slitlamp, is directly under the capsule and emphasizes the fiber and suture pattern. It is important to test for calcium and phosphorus. In some cases of old epilepsy, typical chronic cataracts of this description may be found. Dinitrophenol is a material toxic to the parathyroids and has produced parathyroid cataract changes in its incipiency. Dinitrophenol may affect the parathyroids, as verified by Spaeth, who removed a dinitrophenol cataract. The patient later developed tetany.

Dr. Bothman had included keratoconus cases as being related to this discussion, which was a mistake. He himself had seen more than 70 keratoconus cases under the slitlamp. None gave evidence of cataract. Dr. Bothman also mentioned a case of keratoconus with Horner's syndrome and heterochromia. These lesions are entirely foreign to the subject of tetany. The pictures of tetany cataract are clearly shown in Vogt's "Atlas." It is a definite clinical entity.

Dr. J. E. Lebensohn agreed with Dr. Bothman that parathyroidectomy cataract is much more common than the literature

would indicate. He had seen three cases, one of which had just undergone operation. According to one European observer, cataract may be anticipated in 80 percent of cases with manifest or latent tetany after thyroidectomy. The cataract generally starts within three months after operation, and is usually complete in two years. Punctiform and filiform opacities develop in the superficial layers of the cortex, especially posteriorly and in the axial area. Rickets and parathyroid deficiency are both associated with low blood calcium and tetany and cataract are secondary manifestations. Cataracts may be consequent to an increased permeability of the ciliary epithelium. After a parathyroidectomy, the physico-chemical changes in the blood cause a decrease in the urinary phosphorus excretion, and an increase in the inorganic phosphates of the blood. The increased concentration of phosphate ions produces, in turn, a reciprocal decrease of ionized serum calcium. A balanced antagonism exists between the parathyroids and vitamin D; the parathyroids protecting the body from the effect of an excess of the latter, as might occur with overexposure to sunlight. After parathyroidectomy an excess of vitamin D would favor metastatic calcification and cataract. Parathyroidectomized rats kept in the dark do not develop cataracts, hence it might be advisable for the patient with postoperative tetany to avoid sunlight and foods rich in vitamin D. The patient with parathyroid tetany may exhibit other trophic ectodermal changes such as falling hair, brittle nails, dental disturbance, all of which are unfortunately not influenced by administration of parathyroid hormone.

Dr. Louis Bothman (closing) said that he had purposely omitted reference to the physiology of the parathyroids. Dr. Lebensohn had answered in part Dr. von der Heydt's criticism. The second case shown was a real tetany cataract as Dr. von der Heydt described it. That type of cataract followed a tetany which occurred with rickets and responded to vitamin-D therapy. This was shown for comparison because tetany occurs also with parathyroidectomy. The third case, which Dr. von der Heydt said was a complicated cataract, did meet with that description, but was the typical picture of a lens opacity following parathyroidectomy or atrophy of the parathyroids following thyroidectomy. For that reason, he felt it should be called a parathyroid cataract. The same picture of posterior subcapsular opacities seen with diabetes, he believed, should be called a diabetic cataract. These two conditions might be properly grouped as endogenous, not complicated, cataracts, and the term "complicated cataract" should be reserved for the picture showing subcapsular posterior and anterior (lenticular) opacities when it follows an inflammation or disease of the eye *per se*. Dr. von der Heydt felt that the picture was further confused by showing keratoconus with complicated cataracts. If he had seen 70 cases of keratoconus without cataract, surely the condition was uncommon enough to be presented. Attention was called to the occurrence of endogenous cataracts with keratoconus similar to the two cases found in the literature.

Robert von der Heydt.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Published Monthly by the Ophthalmic Publishing Company

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MISSOURI TRACHOMA HOSPITAL

Trachoma, the world's number-one problem of ocular inflammation (and until recently number one in causes of blindness in Missouri, but now surpassed by venereal diseases), has maintained a tenacious grip upon the backwoods districts of the Ozark Mountains. In spite of energetic effort on the part of the government and the state, betterment of this condition has been very slow, largely because of the difficulty in penetrating this region physically and educationally. Its people are so-called mountain whites, poor, proud, and suspicious of offers of help. Crowded in dirty cabins, clothed in unclean garments, and with an inadequate water supply, they have offered ideal ground for the spread of this disease which adds to their misery and incompetence.

For Missouri, in dollars and cents alone, the matter has been one of considerable moment. Counting only money actually expended for pensions, this has amounted to $2,000,000 since 1922, and this takes no account of money lost by incapacity of the large number of persons seriously affected. It is difficult to estimate the number of these, but there are probably not less than six or seven thousand in this one state.

The base from which the government

and later the state have worked towards cleaning up this disease in Missouri has been Rolla, situated in the picturesque Ozarks, about 100 miles southwest of Saint Louis. There, in makeshift quarters, patients with the most urgent cases have been housed—sometimes, weather permitting, more literally "tented"—and treated during the acutely active periods of inflammation. Even at the greatest expansion of equipment and space no more than 45 patients could be taken care of at one time. This excluded many who seriously needed help. Inadequacy of facilities proved a further detriment.

Hence it was a matter of great importance to public health in Missouri when the legislature passed an appropriation for the construction of a hospital to be devoted to the study and treatment of trachoma. The cornerstone was laid on July 29, 1939, and the hospital opened on February 1, 1940.

The building is modern in every detail and is capable of housing from 65 to 70 patients. Under the able direction of Dr. J. E. Smith, who has behind him an excellent experience with trachoma, not only is expert care being given the inmates but it is now possible to make a scientific study of the disease under well-controlled conditions. The published results of efforts to evaluate different methods of treatment have too often been confusing because of failure to control them adequately. This has been especially conspicuous in most of the reports on sulfanilamide used systemically, there having been only a few instances in which no local treatment was used and cases in which local treatments also were employed are almost valueless for determining the merits of sulfanilamide administered internally.

The building of this trachoma hospital has already proved an important stimulus in the local fight against this disease and it is thought that not many years will pass before it will be eliminated.

Lawrence T. Post.

BOOK NOTICES

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY. Forty-fourth annual meeting, 1939. Clothbound, 458 pages, illustrated, Omaha, 1940.

The volume of Transactions of the forty-fourth annual meeting of the American Academy of Ophthalmology and Otolaryngology was dedicated to Dr. Nelson Miles Black. The papers of the Joint Session consisted of the address of the president, Dr. George M. Coates, on the trend of Academy programs, stressing the value of the courses of instruction; the address of the guest of honor, Dr. Burt R. Shurly, "Handicapped children in relation to otolaryngology"; and a "Symposium on essential hypertension." In the symposium the condition from the standpoint of otolaryngology was discussed by Drs. Furstenberg, Maxwell, and Richardson, and from the standpoint of the internist by Dr. Roy W. Scott. Dr. Henry P. Wagener presented the ophthalmological standpoint in an excellent discussion of the nature and significance of the retinal lesions associated with hypertensive disease, in which he concludes that the ophthalmoscopic changes in these patients are primarily demonstrations of disturbed physiology of the arterioles, usually being functional rather than organic.

The first half of the Transactions is devoted to 9 ophthalmic papers, while in the second half are 11 papers on otolaryngology. As this is the final issue of the Transactions in the present form, an index of contents from 1921 through 1939 is included.

The opening paper of the ophthalmic section was on general hypertension and the optic pathways by Igersheimer of Istanbul, Turkey. On the basis of ophthalmoscopic and histologic studies of the optic nerves, he concludes that degenerative changes in the optic nerves secondary to hypertension are more frequent than generally supposed. They may be ascending due to destruction of the retinal ganglion cells, descending following chiasmal lesions, or may occur independently in the nerve due to changes in the small vessels in the nerve tissue. (This paper will be published in full in the Journal.)

A case of acute hydrops of the cornea complicating keratoconus was reported by Rychener and Kirby. They believed that the condition is due to a rupture in Descemet's membrane and were able to induce a similar condition in rabbits. As there is usually clinical improvement following the acute process as evidenced by reduction of corneal ectasia and clearing of the cornea, the authors suggest a posterior keratotomy as a possible procedure in the treatment of high degrees of keratoconus.

Wiener and Alvis described a new technique for corneal transplantation using a beveled graft cut with a newly designed corneal punch. (This paper is published in full in this issue of the Journal.) Evidence was presented by W. H. Muncy of the value of high vitamin-B intake in the prevention of the ocular complications of tryparsamide therapy. Hitz described and evaluated the visual testing methods commonly employed in the primary schools.

The treatment of accommodative convergent squint was discussed by W. T. Davis. He stressed the advantages of removing the glasses in those cases in which the accommodative-convergence relationship could be successfully reëducated.

The condition of pulsating exophthalmos was covered fully in the paper of Meyer and Sugar, who report a series of six cases. In the true cases they recommend, first, rest with a compression of the carotid with a cervical truss. If necessary, later, total or partial ligation of the common carotid is indicated.

Leinfelder reported on an experimental study of the retrograde degeneration in the optic nerve and tracts. He found that the visual pathway is not peculiar in its reaction to degeneration, and that this is in proportion to the extent of the injury and its distance from the nerve cell. (This paper was published in full in the July issue of the Journal.)

A case of glaucoma, which followed radiation therapy of a squamous-cell carcinoma of the lid, was reported by Bothman. The chief interest lay in the histologic examination, which showed breaking up of the anterior uveal-pigment epithelium with its dispersion over the anterior of the iris and in the spaces of Fontana. It was concluded that the pigment disturbance was an effect of the radiation and that the glaucoma was due to the mechanical effect of the blocking of the aqueous escape from the eye.

T. E. Sanders.

THE PATHOLOGY OF THE OPTICAL AFTERIMAGES AND THEIR CLINICAL IMPORTANCE. By Vladimir Vujić and Kurt Levi. 86 pages. Supplement to Ophthalmologica. Published by S. Karger, Basel, 1939.

The disturbances of the optical afterimages have been, up to now, an unknown field in the study of disease. The present findings represent only the first step in the exploration of this subject. It is today an undisputed fact that the recognition of colors is early disturbed in many diseases of the nervous system.

If a colored object is looked at for a

certain time, and the observer subsequently gazes at a gray or white surface an afterimage is produced. When the afterimage appears in the same color as the original object, the afterimage is called a positive one; when in its complementary color, it is known as a negative afterimage. The use of pure monochromatic colors is preferable. The brightness of the afterimage is independent of the intensity of the color of the object but is entirely dependent upon its brightness. The afterimages are not immediate nor continuous in their appearance; after a latent period of between 3 and 7 seconds, the observer first sees the afterimage for a short time. Then it disappears to reappear again after several seconds. This process of disappearance and return of the afterimage occurs two to three times. Lighted color-tranparencies produce more valuable clinical results with coarser but more definite afterimages and more frequently negative ones. The examination is not made in a completely darkened room, because the size of the afterimage could not then be measured. The lighted color serving as the object is produced by a translucent electric lamp of 75 candlepower. This lamp is screened everywhere except on one side, leaving a circular opening 21 cm. in diameter. Before this opening a transparent white paper is stretched and in front of this a colored-glass plate. By this method, the colored-glass plate is 6 cm. away from the lamp. A colored solution in a flask, producing a monochromatic light is still better than a colored-glass plate. The examined individual is about 35 cm. from this colored circle of light. He gazes at its center for 30 sec. The size of the colored circle of light should correspond to the size of the normal monocular visual field for each color. Four colors are used: red, yellowish green, blue, and yellow. After fixation of the lighted circle for 30 seconds, the lamp is shut off and the subject looks at a dull-white background, 2.20 m. away. Upon this background, a coördination system is delineated, and the subject fixates upon the crossing-point of both arms of the coördination system. The size of the circular afterimage in normal individuals has an average radius of 40 cm. with a variation in breadth of between 30 and 45 cm.

Examination with optical afterimages is valuable in the study of color blindness and color weakness.

A long list of pathologic changes in the negative afterimages observed in numerous common neurologic conditions is tabulated by the author. A sufficient number of these neurologic conditions showed changes in the afterimages to make the study of the afterimages valuable in their diagnosis.

H. D. Lamb.

BIELSCHOWSKY'S LECTURES ON MOTOR ANOMALIES. Foreword by Walter B. Lancaster, M.D. Illustrated. Paper bound, 128 pages. Dartmouth College Publications, 1940. Price $1.00.

When Professor Alfred Bielschowsky of Leipzig came to America on a lecture trip, in 1934, he found the medical profession ready to listen and to learn what he had to teach. He found hearers already interested in the movements of the eyes and their anomalies. For more than 20 years he had been writing and teaching on this subject; but to the ophthalmologists of Europe he was little more than "a voice crying in the wilderness." His permanent joining of the Dartmouth Eye Institute was a striking instance of Europe's loss to America's gain. The foreword by Dr. Lancaster gives a brief account of the life of this student of ophthalmic science.

In various parts of the United States,

Dr. Bielschowsky gave over 100 lectures and demonstrations of his understanding of ocular motility. He had worked in Leipzig, Marburg, and Breslau before coming to America. What he had learned and taught was well worked up and arranged for the lectures he gave before the Research Study Club of Los Angeles in 1938, which were published in this Journal. Readers of the American Journal of Ophthalmology may think that, having read the lectures in the Journal, they do not need this book. But the arrangement of the material in one volume, with its table of contents, its adequate, carefully prepared index, and photographic portrait of the author as a frontispiece, makes this volume of real value to every student of ophthalmology.

Edward Jackson.

CORRESPONDENCE

A SIMPLE AND INEXPENSIVE AID FOR THE COLOR-BLIND MOTORIST

Editor,
American Journal of Ophthalmology.

Dear Sir:

In the May number of the American Journal of Ophthalmology, Dr. B. F. Payne describes a valuable aid for color-blind motorists. The essential feature of this aid consists of red pasters on the upper part of the lenses of special driving glasses. Through the red segments the red and orange lights of the stop-and-go signs show clearly, whereas the green light is practically eliminated. Thus the driver waits so long as there is any light and goes forward when the light goes out.

I was especially interested in Dr. Payne's observation, as a color-blind patient of mine had been arrested for passing a red light a few days before Dr. Payne's article appeared. The patient was eager to secure a pair of the glasses described but wanted to know the cost. Pending inquiry on this point, it occurred to me that a piece of red glass pasted on the windshield of the car would answer the same purpose as the special glasses described. In the absence of a suitable piece of red glass a piece of red celluloid was used. The patient has found this entirely satisfactory and no longer has any difficulty in knowing when to stop and when to go.

This further simplification in the application of the principle enunciated by Dr. Payne commends itself for both its convenience and its economy.

(Signed) William H. Conner.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP
ASSISTED BY DR. GEORGE A. FILMER

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Block, H. M. **Ocular transilluminators made of lucite.** Arch. of Ophth., 1940, v. 23, March, pp. 627-628.

The transilluminators are similar to the Zeiss models, but are made of lucite instead of quartz. The point is 1.5 mm. in diameter and delivers light of 2½ foot candles. This can be reduced by means of a rheostat. J. Hewitt Judd.

Duggan, W. F. **Tangent-screen scotometry.** Arch. of Ophth., 1940, v. 23, Feb., pp. 316-339.

Tangent-screen scotometry is the only diagnostic procedure with which one can detect and locate small or early lesions in the visuosensory system while the changes are still physiologic, that is, due to some interference with the oxygenation and nutrition of the nerve cells or nerve fibers. Fourteen cases representing various changes are presented with their perimetric charts to illustrate that careful scotometric examination was the essential factor in making a correct diagnosis or in evaluating or corroborating the results of the therapy. The sensitivity of this test depends upon the use of test objects subtending small visual angles. Since there is a practical limit to the size of the test objects which can be procured, the minimum distance at which the screen should be placed is about 1 meter. Correct plotting and interpretation of fields demand a knowledge of the anatomic structure and physiologic function of the eye, the optic nerves, the tracts, and the optic radiations, as well as of the types of field defect found in various parts of the visual system. Therefore, scotometric tests should not be intrusted to technicians as each case presents an individual problem and no single routine is applicable in all cases.

J. Hewitt Judd.

Ravin, L. C. **A simple and inexpensive chin rest for use with a tangent screen.** Arch. of Ophth., 1940, v. 23, April, pp. 839-840.

A chin-rest piece is fitted on to a rod which is inserted into the tubular shaft

of a floor-lamp stand with a thumb-screw adjustment. The instrument is recommended as requiring very little space and being inexpensive.
J. Hewitt Judd.

Wölfflin, E. **Concerning errors of diagnosis in ophthalmology.** Schweiz. med. Woch., 1939, v. 69, no. 44, p. 1075.

The author speaks of conditions which may be mistaken one for the other as papilledema and pseudoneuritis, pseudoneuritis and high hyperopia, glioma and retinal angiomatoses, retinal tumors and Coats's disease. He points out ways to differentiate these conditions. Theodore M. Shapira.

Woods, A. C., and Burky, E. L. **Experimental studies of ocular tuberculosis. 5. The question of organotropism, or the selective sensitization of the second eye.** Arch. of Ophth., 1940, v. 23, Feb., pp. 363-368; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1939, 90th mtg., p. 331.

The results of experiments on immune-allergic rabbits indicate that a tuberculous disease in an eye does not produce selective sensitization of the second eye; that the unaffected eye and the skin react in like manner to a secondary tuberculous focus in one eye; and that the general reaction of an immune-allergic rabbit, as manifested by both the ocular and the cutaneous sensitivity, is the same whether the second antigenic stimulus is in the eye or in the groin. J. Hewitt Judd.

2

THERAPEUTICS AND OPERATIONS

Blondis, R. R. **Bipolar fixation.** Arch. of Ophth., 1940, v. 23, March, p. 626.

The instrument described consists of two ordinary fixation forceps upon a sliding bar, thus allowing the distance between them to be varied and exactly maintained. J. Hewitt Judd.

Egorov, I. **Regeneration of corneal nerves following corneal section.** Viestnik Opht., 1940, v. 16, pt. 1, p. 3.

The material consisted of 32 guinea pigs of the same age and weight. The corneal section included one third of the corneal periphery with a small bridge to prevent prolapse of the iris. Sixty-one eyes were operated upon and the investigation continued for 96 days. Staining of the cornea with methylene blue permitted study of the regenerative process of the corneal nerves in the affected areas. Beginning the examination of the cornea on the twelfth day, when cicatrization was firm, it was found that in typical cases regeneration of the corneal nerves was complete at the end of the third month. Regeneration of the sectioned corneal nerves proceeded not only from their central end, as is usually the case in nerve regeneration, but frequently in distant areas collateral fibers extended from these nerves toward the cicatrix and entered its stroma. The microscopic picture indicated that the regenerative process may take place at any point of the nerve. During restoration of innervation there was a period of hyperinnervation, usually about the sixtieth day, when there was seen an excessive number of nerve fibers. When the process was complete the number of nerve fibers was again reduced to normal. (Photomicrographs.) Ray K. Daily.

Grigoriev, V. I. **The open management of postoperative wounds.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 51.

An analysis of 456 surgical cases treated by the open method indicated that surgical complications were no

more frequent than in eyes protected by bandages. The merits of the open method are elimination of helplessness, simplification of the postoperative course, economy in nursing personnel and dressing material, and shorter hospitalization period. Ray K. Daily.

Persichetti, Carlo. **Experimental studies on reaction of the eye to intravenous injection of animal carbon.** Boll. d'Ocul., 1939, v. 17, May, pp. 373-389.

After intravenous injection of a suspension of animal carbon into albino rabbits, Persichetti noticed that this substance was deposited exclusively inside the blood vessels, especially those of the choroid. No inflammatory reaction was observed in the surrounding tissues. The same findings were observed in eyes experimentally inflamed by chemical substances. No elimination of the carbon was noted. (Bibliography, 6 figures.) M. Lombardo.

Stieren, Edward. **Increasing the magnetic-field intensity of portable electromagnets.** Trans. Amer. Ophth. Soc. 1939, v. 37, p. 405.

By using 220-volt direct current, available now in most hospitals, greater voltage, and hence amperage, may be applied to the ordinary electromagnet with corresponding increase in the magnetic field, and without overheating.
David O. Harrington.

Waugh, D. D. **An inexpensive disposable eye dropper.** Arch. of Ophth., 1940, v. 23, Feb., p. 381.

These droppers are made from cellophane drinking "straws," which are cut into four-inch lengths, sealed on one end by folding, and sterilized at thirty-pounds pressure for thirty minutes. It is found that they will pick up three drops of water. The author hopes that they may soon be sold already sealed and sterilized. J. Hewitt Judd.

Whalman, H. F. **Newly designed thermophore conductors.** Arch. of Ophth., 1940, v. 23, Feb., p. 380.

The curved tips, which are illustrated by photographs, allow a horizontal application of the thermophore, give better visibility of the region to which it is applied, and allow treatment to areas otherwise inaccessible with a straight tip, such as in retinal separation.
J. Hewitt Judd.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Berens, Conrad. **Modification of the Worth four-dot test.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 561-562.

Berens, Conrad. **A test for binocular vision particularly applicable to the examination of amblyopic children (modified Worth test).** Amer. Jour. Ophth., 1940, v. 23, June, pp. 687-688; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 406.

A modification of the Worth four-dot test is described for use at 6 meters and at 25 cm. The dots are replaced by three characters readily recognizable by children and large eough to stimulate vision in eyes with considerable amblyopia. David O. Harrington.

Cassovski, I. H., and Khollova, A. H. **Binocular and monocular light sensitivity of the retinal periphery.** Viestnik Opht., 1939, v. 15, pt. 5, p. 89.

The data of this study in physiologic optics show that the average ratio of binocular to monocular sensitivity for various colors and in various areas of the retina is 1.93 to 1. Deviations from this ratio are explained by the effect

of incidental stimuli and lack of attention. This ratio holds for the entire course of dark adaptation. In the dark-adapted eye the retinal sensitivity is greater for blue and green than for white and lower for orange-red than for white. Ray K. Daily.

Dimshitz, L. A. **Quantitative study of Purkinje's phenomenon.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 58.

This is a laboratory study of color sensitivity in graduated light. The sensitivity for red, blue, and white was tested. The study shows that the highest sensitivity, which is for white, decreases only in greatly reduced illumination. Sensitivity for red falls rapidly with reduction of illumination. Sensitivity for blue is lower than for red, but is more resistant to reduction in light. The method used suggests the possibility of its clinical application for the diagnosis of night blindness. The curves obtained further confirm the interdependence of the central and peripheral systems of the retina. Ray K. Daily.

Doyne, P. G. **Number forms.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 603.

Persons who are imaginative almost invariably think of numerals in some form of visual imagery. The form may assume a variety of grotesque shapes, all sorts of angles, bends, and curves. There appears to be a definite hereditary factor as to possession of this faculty, but not as to the detailed arrangement of the shape.

Beulah Cushman.

Eggers, Harry. **The optical principles of telescopic spectacles.** Trans. Amer. Ophth. Soc., 1939, v. 37, pp. 410-421.

The optic principles of telescopic spectacles are outlined in detail with all necessary formulae for their understanding in both near and distant vision. For comparative purposes there is an explanation of the Galilean telescope and an application of the principles of this telescope to telescopic spectacles. David O. Harrington.

Escher-Desrivières, J. **Contribution to the study of the perception of heterochrome contrasts by the juxtamacular retina.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 594.

This study is said to demonstrate that the classic numerical quantities which express the relative sensibility of the retina for blue and for red apply solely to macular vision. From a practical point of view the definition of the blue-red color values in the peripheral vision is accidental and uncertain. Also the brilliance of blue on a red background is more marked in juxtamacular than in direct vision, using the same degree of physical stimulus. The author notes that his results seem to agree perfectly with those concerning lateral vision recently reported by d'Yves le Grand who has demonstrated that the classic curve of visibility for colored lights does not apply to lateral vision; that the peripheral sensibility for brilliance of colors is affected by certain time factors; and that in every case the maximum of sensibility is moved toward the short wave-lengths with regard to the position of this maximum in strictly macular vision. (1 reference, 2 tables.) Jerome B. Thomas.

Friedman, Benjamin. **Acceptance of weak cylinders at paradoxic axes.** Arch. of Ophth., 1940, v. 23, April, pp. 720-726.

It is found that when a weak cylinder is indicated in the horizontal axis by

retinoscopic examination but is demanded in the vertical axis by the patient, the spherical correction is deficient by an equal amount. When this deficiency is corrected, the patient will usually accept the cylinder in the proper axis. This phenomenon is due to the fact that test letters are more readily recognized when the vertical components are clear and the horizontal components blurred than when there is a lesser but uniform blur of all parts of the letters. J. Hewitt Judd.

Gloor, A. **Observations on stereoscopic binocular single vision in unilateral aphakia (following cataract extraction).** Schweiz. med. Woch., 1939, v. 69, Dec., p. 1120.

Gloor cites his own case to prove that stereoscopic binocular single vision was possible after Vogt had removed one cataractous lens.

Theodore M. Shapira.

Hunter, Andrew. **A new lens.** Arch. of Ophth., 1940, v. 23, April, pp. 839.

The lens is similar to the "myodisk" lens but the sharp edge of the concave part has been replaced by a gradual curve. J. Hewitt Judd.

Krapuventzeva, C. **The influence of some visual factors on the sensitivity of the fovea centralis.** Viestnik Opht., 1940, v. 15, pt. 5, p. 100.

This laboratory investigation deals with the effect of illumination of the retinal periphery on foveal function. The data show that the contrast sensitivity of the fovea is raised by low illumination of the retinal periphery, and lowered by a brightly illuminated retinal periphery. Ray K. Daily.

Lawson, Arnold. **The latest principles for applying tinted glass to industrial and other purposes.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 683.

The author discusses the practical principles which should govern the prescribing of tinted lenses in health and disease. Glass for industrial purposes protects from both visible and invisible radiation and at the same time provides the workman with sufficient light to do his job. This is accomplished by variations in the thickness and color of the glass and by absorption of invisible radiation by metallic elements incorporated in the glass. Glasses for protection are divided into five grades, according to the kinds of radiation absorbed, and are prescribed with the specification permanently marked on them. The author recommends specific types for aviation, outdoor sports, early cataract, and inflammatory affections of the eye.

Beulah Cushman.

Lijo Pavia, J., and Caneveris, R. A. **Aniseikonia.** Rev. Oto-Neuro-Oft., 1939, v. 14, May, p. 115.

A short discourse upon the fundamentals of aniseikonia.

Edward P. Burch.

Marron, James. **Cycloplegia and mydriasis by use of atropine, scopolamine and homatropine-paredrine.** Arch. of Ophth., 1940, v. 23, Feb., pp. 340-350.

This report includes a review of the literature and a discussion of the author's procedure in comparing the effects of a 1-percent solution of atropine sulphate, a ½-percent solution of scopolamine hydrobromide, and a 5-percent solution of homatropine hydrobromide used in conjunction with 1-percent solution of paredrine. The results are compared as to (1) the length of time necessary for the induction of

complete cycloplegia and mydriasis, (2) the time of occurrence and the amount of minimum range of accommodation and maximum mydriasis, (3) the duration of maximum cycloplegia and mydriasis, and (4) the length of time necessary after instillation of cycloplegia for (a) recovery of the ability to do close work, and (b) return to the normal range of accommodation and normal pupillary diameter.

J. Hewitt Judd.

Mills, C. K. **Angles alpha, gamma, and kappa.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 686-687.

Payne, B. F. **Glasses for the color-blind motorist.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 566-567.

Preston, F. E. **A new unobtrusive occluder.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 745.

Preston describes a lens through which the patient can read but which completely blurs the distant vision. This glass is of value in detecting malingerers and as an occluder.

Beulah Cushman.

Richards, G. M. **Spectacle lenses for use during operations.** Arch. of Ophth., 1940, v. 23, March, pp. 625-626.

A bifocal with a vertical segment 10 by 24 mm. placed near the middle of an ordinary spectacle lens, equidistant from the top and bottom of the lens is described. The upper pole of each segment is tilted templeward 1 mm. to allow for separation of the visual axes in the upper fields. A 1-degree prism, base in, is ground in each segment to relieve some of the excessive convergence at the short focal distance.

J. Hewitt Judd.

Satz, L. P. **Diagnosis and treatment of accommodative asthenopia.** Viestnik Opht., 1939, v. 15, pt. 5, p. 65.

Positive accommodation was determined by finding the strongest concave lens with which the eye could maintain its normal visual acuity for distance. In cases with accommodative asthenopia positive accommodation was trained by the use of concave lenses in increasing strengths; the results of such training were satisfactory. The investigation was done on university students complaining of difficulties in near work.

Ray K. Daily.

Schupfer, F. **The astigmatic effect from decentration of some types of lenses.** Boll. d'Ocul., 1939, v. 18, April, pp. 244-262.

In graphic form the writer gives the results of his observations, which show that positive or negative periscopic lenses, meniscus lenses, and punktal lenses, all provoke an astigmatism if the lenses are decentered or inclined. (Bibliography.)

M. Lombardo.

Sudranski, H. F. **Relation of dynamic to static refraction in presbyopic patients forty through fifty years of age.** Arch. of Ophth., 1940, v. 23, March, pp. 545-553.

This report is based on the study of one hundred patients refracted by the fogging method of manifest refraction. Retinoscopic and trial-case examinations were made after instillation of eucatropine hydrochloride and again after instillation of homatropine hydrobromide; these being followed in each case by postcycloplegic examination. It was found that refraction by the manifest method and with eucatropine did not compare favorably with refraction under homatropine because there were appreciable variations in the strength

of the cylinder, frequent variations in axis, and failure to detect a cylindric error in a large proportion of the eyes examined. Eucatropine was demonstrated to be a weak cycloplegic and refraction with it was, therefore, slightly more efficient than with the manifest method. The author concludes that homatropine cycloplegia should be used for a precise determination of the refraction of presbyopic patients in the fifth decade. J. Hewitt Judd.

Town, A. E. **Impression technique for contact glasses.** Arch. of Ophth., 1940, v. 23, April, pp. 822-824.

The method described by the author consists of obtaining the scleral approximation by the use of dental wax and the impression of the cornea and limbus by the negocoll-hominit procedure. The positive form is made of dental stone and the skeleton glass is made from this form.

J. Hewitt Judd.

Tron, E. Z. **Correlation in the optical system of the eye.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 190.

The material consisted of 150 eyes. The correlations investigated were those of refraction and length of axis; of refraction and dioptric power of the eye; of refraction and dioptric power of the cornea; and of refraction and dioptric power of the lens. The data showed a correlation between the refraction and the axis of the eyeball, and between the refraction and the dioptric power of the eyeball. Ray K. Daily.

Vásquez-Barrière, A. **Neurovegetative disturbances of astigmatism.** Arch. Uruguayos de Med., Cirugia, y Especialidades, 1940, v. 16, Jan., pp. 16-37.

This long paper, with the subtitle "Comments on the work 'Astigmatic syndrome' by Dr. L. A. Chaves Velando," is a discussion of the symptomatology of astigmatism, with its direct and remote nerve relationships. The monograph by Chavez Velando had appeared as a volume of more than eight hundred pages. W. H. Crisp.

Vishnevski, H. A. **Visual chronaxia in anophthalmos following enucleation.** Viestnik Ophth., 1939, v. 15, pts. 3-4, p. 36.

Tests on normal and enucleated eyes indicated that the electric current stimulates the fibers of the optic nerve and not the retina. Ray K. Daily.

Walls, G. L. **Postscript on image expansion by the foveal clivus.** Arch. of Ophth., 1940, v. 23, April, pp. 831-832.

The author adds the data from Valentin's measurements of the retinal indices to support his belief that the refractive index of the retina is higher than that of the vitreous (Amer. Jour. Ophth., 1938, v. 21, June, p. 607), thus showing that the purpose of the depression is to expand the image locally by peripheral refraction of the eikonogenic rays where they strike the internal limiting membrane along the clival surfaces. J. Hewitt Judd.

Weeks, J. E. **Scintillating scotoma and other subjective visual phenomena.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 513-519; also Trans. Western Ophth. Soc., 1939, 6th mtg.

Zimkin, H. B., and Lebedinskii, A. B. **Forms and center of interaction of the various elements of the visual-perception apparatus.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 72.

A review of the literature. The authors emphasize that activity of receptors is accompanied by a complex ac-

tivity in the various afferent systems, as well as in the various elements of the same system. In the visual apparatus this interaction takes place between the two eyes in color vision, between the rod and cone apparatus, and between the more central and the more peripheral retinal areas. The interaction is characterized by phases of raised and lowered sensitivity. Whether the stimuli for the interaction originate within the retina or within the corresponding nerve centers has not as yet been determined. Ray K. Daily.

4

OCULAR MOVEMENTS

Bardanzellu, Tomaso. **The "hook" operation for strabismus.** Rassegna Ital. d'Ottal., 1939, v. 8, Nov.-Dec., p. 656.

The author describes an original method for shortening the lateral rectus muscle. The muscle is freed as in any operation, but its attachment is not severed; the conjunctiva anterior to the insertion is dissected up and a double-armed suture (silk or catgut) is passed beneath it. The needles are inserted in the sclera near the limbus and brought out on the conjunctiva. Rotating the eye outward, a loop of muscle is formed which is brought forward to the point where the needles were introduced. On tightening the loop of suture the muscle is folded, "hooked," and tied in place. In cases of marked convergence a tenotomy of the medial rectus is also performed. A monocular dressing is applied and good results are reported. (17 figures.)

Eugene M. Blake.

Berens, Conrad. **A test for heterophoria.** Trans. Amer. Ophth. Soc., 1939, v. 37, p. 407.

A modified Maddox rod of thermoplastic material is described in which one half the rod has a 0.75-D. prism. The rod is useful for detection of malingering, for rapid determination of low degrees of phoria, and for study of Maddox-rod deviations in the peripheral regions of the field of binocular fixation in patients who have normal retinal correspondence.

David O. Harrington.

Bonnet, P., and Bonamour. **Concerning diabetic ocular palsies.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 485.

A report of two cases of diabetes with transitory ocular palsies.

Butler, T. H. **Discussions on miners' nystagmus.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 749.

The symptoms of miners' nystagmus are given in the order of their relative importance (headache, insomnia, vertigo, dazzling from lights, oscillation of lights and objects, bad sight, night blindness, and twilight blindness). The three main theories as to the etiology have been based upon posture, illumination, and the toxic factor. The toxemia may be influenced by deprivation of sunlight and irregularities in vitamin intake. The author feels that the condition is due to a nervous derangement.

Beulah Cushman.

Caiger, Herbert. **Discussion on miners' nystagmus.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 769.

Many miners over 45 years of age show oscillations of the eyes, but they are not disabling and the miners may be unconscious of them. Illness, accident, or suggestion may lead to a breakdown of the inhibitory mechanism, and the oscillations become associated with

interference of vision and with dizziness. Then comes the fear of blindness, of long-continued unemployment, of chronic financial stress for himself and family, and finally the prospect of losing his job permanently. Therefore 75 percent of miners' nystagmus is industrial fear, and an atmosphere of friendly coöperation must be secured between employers and employed.

Beulah Cushman.

Cass, E. E. **Strabismus and its treatment.** Ophth. Ibero-Americana, 1939, v. 1, no. 2, pp. 71-127.

This is a series of lectures (reported in Spanish), totaling 57 pages, delivered at various ophthalmic centers in South America. The authoress is Director of Saint Mary's Hospital, London, England. W. H. Crisp.

Chambel, Perihan. **Unilateral ophthalmoplegia with migraine following a metastatic tumor of the hypophysis.** Türk. Oft. Gazetesi, 1938, v. 2, pt. 10, p. 484. (French abstract: 1938, v. 2, pt. 11, p. 585.)

This is a case of a man aged 61 years who had total internal and external ophthalmoplegia of the right eye with migraine and ascites. At autopsy there was found a widespread tumor of the stomach, pancreas, liver, peritoneum, suprarenals, and the base of the right lung. The pathologic diagnosis was lymphosarcoma. There was also destruction of the posterior clinoids and a metastatic tumor the size of a cherry in the region of the hypophysis. The tumor was intrasellar and took origin at the anterior border, pushing the posterior lobe backward and downward and compressing the motor nerves, particularly the oculomotor of the same side. Both lobes of the gland were involved by the tumor.

George H. Stine.

Ferguson, W. J. W. **Mine lighting in its relation to miners' nystagmus.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 775.

Miners' nystagmus closely resembles congenital nystagmus, which is due to a disturbance of the normal fixation reflex by the absence or alteration of the macular images from birth to early infancy. Therefore some disorder of bilateral macular fixation may be part of the explanation. The previous estimation was that a brightness of 0.01 candle per square foot is necessary to allow the fovea to function properly. Experimental work was carried out with varying amounts of light, and sufficient light did not entirely eliminate miners' nystagmus. But miners' nystagmus is comparatively unknown in the United States where extensive floodlighting of the coal face is coupled with high-power cap-lamps.

Beulah Cushman.

Freiberger, Moses. **Operation on the ocular muscles.** Arch. of Ophth., 1940, v. 23, April, pp. 833-838.

The author's technique of recession, which consists of a horizontal incision of the conjunctiva and the insertion of a single suture through the conjunctiva, muscle, and sclera and back through the muscle and conjunctiva, is described as being easier and fully as effective as Jameson's technique. A modification of the Reese resection operation is also described and several points as to operative technique are presented and demonstrated in drawings.

J. Hewitt Judd.

Gibson, G. G. **Analysis of operative results in concomitant convergent strabismus.** Arch. of Ophth., 1940, v. 23, March, pp. 477-486.

This study is based on results obtained in 66 patients of whom 44 had bilateral recession of the internal recti and 22 had unilateral recession combined with resection of the external rectus. Bilateral recession is ideal for young persons with strabismus of from 10 to 35 degrees and in whom rotation shows bilateral and equal excess of action of the internal recti associated with fairly normal external recti. Recession combined with resection is best for cases in which there is unilateral preponderance of muscle abnormalities, and also for strabismus of over 35 degrees. Graduated and standard amounts of correction are indicated except in the presence of contracture, hypertrophy, or atrophy of the muscles; unusually great or diminished muscular action; the presence of various congenital defects; and previous operations for strabismus. The presence of amblyopia in one eye did not seem to alter the effects of either procedure. J. Hewitt Judd.

Lancaster, J. E. **The orthoptic technician as an aid to the ophthalmologist.** Arch. of Ophth., 1940, v. 23, March, pp. 560-563.

The steps for preoperative and postoperative training are outlined, and the treatment for nonoperative conditions, such as accommodative squints and convergence insufficiencies, is briefly discussed. It is pointed out that orthoptics cannot correct anatomic anomalies, since it is essentially a process in reeducation. J. Hewitt Judd.

Luschinski, G. F. **Convergence in various angles of fixation.** Viestnik Opht., 1939, v. 15, pt. 5, p. 21.

A review of the literature and a report of the author's own investigation. In 52.4 percent of the material the proximal point for binocular fixation was 5 to 5.5 cm. Looking up weakened convergence 0.5 to 1 cm. Looking down had no effect on convergence in most cases but in some cases increased it 0.5 cm. To test the convergence of each eye separately was impossible.

Ray K. Daily.

Luschinski, G. F. **A new apparatus for the study of convergence.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 115.

A description of an apparatus for the determination of the maximum convergence in various directions of fixation. (Illustrations.)

Ray K. Daily.

Mann, Ida. **Convergence deficiency.** Brit. Med. Jour., 1940, Feb. 10, pp. 208-210.

A total of 6,400 private cases are analyzed with reference to convergence deficiency, which is characterized by an exophoria of 6 degrees or more on the Maddox wing test and failure of voluntary convergence. A frequency of 2.6 percent was found. The condition is believed to be due to a developmental lag which is functional and not anatomic. The author concludes that the condition is unrelated to age or the type of refractive error and that the condition can be effectively treated by orthoptic exercises. T. E. Sanders.

Miners' nystagmus, discussion on. See Butler, Caiger, Callander (Section 18), and Ferguson.

Paufique, Louis. **Unilateral myopia of high degree with strabismus. Extraction of the transparent crystalline lens.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 476.

Report of a case of high myopia (—18.00 D.) and divergent strabismus of the right eye of a young woman.

Two months after removal of the lens the strabismus had disappeared and the visual acuity had risen from 1/10 to 2/10. Jerome B. Thomas.

Wells, D. W. **The treatment of heterophoria.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 563-566.

West, L. S. **Coincident inheritance of strabismus and nystagmus.** Jour. of Heredity, 1939, v. 30, Nov., p. 496.

Four pedigrees of three generations each are presented. Three of the pedigrees are for strabismus and the fourth is for nystagmus and strabismus. The author concludes that strabismus and nystagmus both show variations in the manner of inheritance. The literature and the cases presented demonstrate that either may be dominant, recessive, or sex-linked recessive.

John C. Long.

5

CONJUNCTIVA

Angius, Tullio. **Vaccinotherapy and specific vaccine prophylaxis of acute conjunctivitis caused by the Koch-Weeks bacillus.** Rassegna Ital. d'Ottal., 1939, v. 8, Nov.-Dec., p. 690.

Because of the difficulty in clearing up cases of acute Koch-Weeks conjunctivitis and of recurrences during the more extensive epidemics in southern Italy, Angius prepared and used a vaccine in treatment and prophylaxis. He comes to the following conclusions: Without great difficulty a vaccine can be prepared from the bacilli. Each c.c. contains a million organisms and is given intramuscularly each day, increasing or decreasing the dose as indicated. Silver salts should be used locally in conjunction with the vaccine treatment. Improvement is rapid, recovery prompt, and cure lasting. The use of vaccine dropped into the conjunctival sac is efficacious. The author urges the prophylactic use upon the unaffected population during epidemics of Koch-Weeks conjunctivitis.

Eugene M. Blake.

Bhaduri, B. N. **A case of Beal's type of follicular conjunctivitis.** Proc. All-India Ophth. Soc., 1938, v. 6, pp. 59-61.

Beal's conjunctivitis is defined as a type of acute follicular conjunctivitis characterized by rapid onset, mild clinical symptoms, preauricular adenitis, and rapid and complete resolution with smears and cultures negative for organisms. In the case reported, the disease was at its height from the fourth to the sixth day and was completely cured with mild treatment by the fourteenth day. This is the first case to be reported from India, although many cases have been identified in America.

Lawrence G. Dunlap.

Bonnet, P., and Colrat, A. **Conjunctivitis with false membranes.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 481.

Report of a case of membranous conjunctivitis in a child of six years, complicated by complete necrosis of the cornea of one eye and diffuse keratitis of the other. The etiology could not be determined. Jerome B. Thomas.

Borovskaja, D. P. **Streptocide in trachoma.** Viestnik Opht., 1940, v. 16, pt. 1, p. 82.

A review of the literature on the use of sulphanilamide and prontosil in trachoma. Ray K. Daily.

Busacca, Archimede. **A method of elective coloration of the rickettsias of trachoma; their etiologic value.** Folia Clin. et Biol., 1940, v. 12, no. 1, p. 1.

Busacca has developed a technique

for coloring the trachoma bodies which he believes to be rickettsias. One slide is colored with methylene blue and Gram stain, another with Giemsa. Busacca employs eosine-methylene-blue in the proportion of one drop to 10 c.c. of the solvent (10 percent of Sörensen's phosphates in distilled water). The phosphate is nine parts of the monosodium to one of the disodium salt. Such a solution has a pH of 6.10 at 18° temperature. The slide is fixed for three minutes in methyl alcohol and stained for 72 to 96 hours, changing the coloring solution two or three times. This technique brings out the bodies very clearly and they are found in large numbers in and between the cells of trachomatous nodules. (4 figures.) Eugene M. Blake.

Cooper, N. E. **Treatment of gonococcal conjunctivitis with intradermal gonococcal vaccine.** Proc. All-India Ophth. Soc., 1938, v. 6, pp. 62-65.

Twelve cases of gonococcal conjunctivitis were treated with intradermal injections of specific vaccine. There were 9 male adults, 1 female adult, and 2 infants (1 male and 1 female). The local treatment was 2-percent silver nitrate each morning, 2-hourly saline washes, and 10-percent argyrol each afternoon. Five cases failed to give local reaction to the intradermal injection and showed little improvement. Even when the dosage was increased, three of these cases still had a persistent discharge and increased chemosis, which responded only to 10 c.c. of milk intramuscular injections. None of the cases showed any form of general reaction or toxic symptoms from injection of the vaccine. The discharge disappeared in from ten to twenty days and the smears were negative about one week later.

The vaccine alone does not arrest the progress of the disease, and other available measures must be used without delay to prevent complications. Eight of the 12 cases were considered as cured without complication, with an average of seven injections of vaccine within a period of three weeks, but the vaccine treatment had to be supplemented by other measures in five of these cases. Three cases had complications in the form of ulcers which perforated and necessitated excision of prolapsed iris. The author concludes that vaccine treatment alone is not a safe and reliable procedure in the treatment of gonococcal conjunctivitis but may be useful as an adjunct to the well-established orthodox line of local treatment. Lawrence G. Dunlap.

Cornet, Emmanuel. **Clinical study of trachoma in relation to other diseases.** Ann. d'Ocul., 1939, v. 176, Dec., pp. 849-857.

Trachoma may be divided into three classes: (1) pure trachoma, (2) trachoma which has become secondarily infected, (3) trachoma as a secondary infection of an eye already diseased. The various combinations of trachoma and other ocular affections are briefly discussed. The classical form of treatment for trachoma is recommended, together with minor alterations and appropriate forms of treating complicating disease. John M. McLean.

Cottini, G. B. **The histopathology of polymorphous erythema of the conjunctiva.** Rassegna Ital. d'Ottal., 1939, v. 8, Nov.-Dec., p. 628.

Polymorphous erythema may be complicated by any one of three forms of conjunctivitis: that with papules on the bulbar conjunctiva, a vesicular type, or an acute purulent conjunc-

tivitis with subconjunctival hemorrhages and pseudomembrane. The author excised the tissue in a case of the papular form occurring in a 23-year-old girl with all the classical symptoms of erythema (fever, skin lesions, pain in the large joints). The microscopic changes are described in detail, and in general showed three principal alterations: proliferative changes in the adventitia of the superficial and deep vessels, an intense cellular infiltration with cuffs about the vessels, and a tendency to cavity formation. (4 figures.)

Eugene M. Blake.

Dastoor, H. D. **Tarsectomy in trachoma.** Proc. All-India Ophth. Soc., 1938, v. 6, pp. 83-89.

The author reports on a series of over 150 cases, operated upon by himself in the past few years, in which he removed the tarsus with the overlying conjunctiva, and in some cases incorporated a mucous graft from the lid following the usual classical method.

Lawrence G. Dunlap.

Dering, S. A. **Methylene blue in the therapy of trachoma.** Viestnik Opht., 1939, v. 15, pt. 5, p. 59.

On the basis of 65 patients treated without undesirable effects, the author arrives at the following conclusions: Methylene blue is an active antitrachomatous substance. The best method of application is daily massage of the lids with a 1-percent solution, and the use of 1-percent ointment. It may be injected subconjunctivally in a 0.25 to 0.5-percent solution. It is not a specific remedy and should be used in combination with other therapeutic procedures. Ray K. Daily.

Fishman, P. R., and Gleser, B. M. **Prophylaxis of ophthalmia neonatorum.** Viestnik Opht., 1940, v. 16, pt. 1, p. 70.

The author urges uniformity in the prophylactic procedure. His choice is of irrigation of the lids with potassium permanganate and instillation of 1-percent silver nitrate. Ray K. Daily.

Forster, W. G. **Treatment of trachoma with sulphanilamide.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 532-534.

Gastev, A. A. **Primary chancre of the bulbar conjunctiva.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 49.

In a young woman 23 years old, the infection probably resulted from the entrance of salivary secretion into the patient's conjunctival sac while conversing and dancing. Spirochetes could not be demonstrated in the superficial secretion, but the hard indurated ulcer promptly responded to antiluetic therapy. Ray K. Daily.

Harley, R. D., Brown, A. E., and Herrell, W. E. **Sulphanilamide and neoprontosil in the treatment of trachoma.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 662-669.

Hartman, W. F. **The prophylaxis of ophthalmia neonatorum with silver acetate.** Pennsylvania Med. Jour., 1940, v. 43, Feb., p. 639.

Hartman favors the amendment of existing laws to allow the use of 1-percent silver acetate in place of silver nitrate in the Credé prophylaxis; it is less apt to cause chemical conjunctivitis. Theodore M. Shapira.

Julianelle, L. A. **Studies on the infectivity of trachoma. 10. Frequency and distribution of the inclusion body and its possible relation to pathogenesis.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 633-644.

Julianelle, L. A. **Transmission of swimming-bath conjunctivitis to monkeys.** Amer. Jour. Ophth., 1940, v. 23, May, pp. 554-560.

Kaul, S. N. **Trachoma.** Proc. All-India Ophth. Soc., 1938, v. 6, pp. 74-77.

The author discusses the surgical treatment of trachoma, stressing resection of part of the cartilage and retrotarsal fold. The stage of acute congestion must have passed before operation. In performing the resection it is necessary to excise a large part of the upper tarsal plate, and sometimes also of the lower, leaving a small bridge near the lid margin for its support, so that entropion does not arise. The author does the operation under general anesthesia. Lawrence G. Dunlap.

Kogan-Abesgus, P. M. **Cytologic studies in trachoma.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 91.

From a study of 117 cases, the author concludes that trachoma has no characteristic cytologic picture, and that there is no parallelism between the cytologic picture and the stage of trachoma. The appearance justifies the interpretation of trachoma as an inflammatory process. Ray K. Daily.

Kolen, A. A. **New two-stage method of conjunctival transplantation.** Viestnik Opht., 1940, v. 15, pts. 3-4, p. 100.

For the restoration of the conjunctival sac the author transplants free mucous membrane into positions most favorable for grafting. When the transplant has taken well it is moved on a pedicle to the desired position.

Ray K. Daily.

Krishnamurthi, K. **Treatment of granular lids (trachoma).** Proc. All-India Ophth. Soc., 1938, v. 6, pp. 66-73.

The author states trachoma is as curable as pulmonary tuberculosis. He discusses prophylaxis, segregation, general tonics, and treatment of general health, in addition to specific treatment by injection of 4-percent "Yatren 105," 3 to 5 c.c., subcutaneously every week for six doses, in simple as well as complicated cases. The usual treatment is recommended for the most frequent complications (corneal ulcer, pannus, and bacterial conjunctivitis) as well as for the most common sequelae (entropion and trichiasis, ectropion, symblepharon, and leucoma).

Lawrence G. Dunlap.

Laborne Tavares, C. **Modification of McReynold's operation for the treatment of pterygium.** Segundo Cong. Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 315-316.

Laborne Tavares, after having used for many years the McReynold method for the treatment of pterygium, introduces the modification of trimming the apex and borders of the pterygium before transplanting it. By this method, the deformity which sometimes is observed after transplantation of the whole pterygium following McReynold's method is eliminated.

Ramon Castroviejo.

Leo, Elia. **Contribution to the study of hyperplastic forms of conjunctiva in trachoma.** Boll. d'Ocul., 1939, v. 17, April, pp. 308-318.

For a long time a man of 26 years affected by trachoma had shown a hard tumefaction of the eyelids. A friable hyperplastic mass was excised with the tarsus and underlying conjunctiva. The mass showed the characteristics of amyloid degeneration similar to that encountered in degeneration of the con-

junctiva in trachoma. The genesis and histologic evolution of the process are discussed. (Bibliography, 6 figures.)

M. Lombardo.

Morax, P. V. **A case of conjunctival lesion with adenopathy of uncertain etiology. Its relation with benign lymphogranulomatosis of Besnier-Boeck-Schaumann.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 436.

Many different infections of the conjunctiva may cause the syndrome of conjunctival lesion with adenitis of the maxillary angle. The author reports the case history of a boy of 11 years who presented a painless swelling of the upper eyelid, under which there was disclosed a fleshy mass in the upper cul-de-sac. There was a hard, painless, preauricular gland and a large gland of the same character at the angle of the jaw; also a chain of cervical glands. The boy was in excellent health with normal temperature. All tests for tuberculosis were negative, as were the tests for syphilis and the intradermal reaction of Frei. Ten days after the first examination the patient's temperature rose to 38.2° and he developed an attack of typical erythema nodosum. Two days later the temperature returned to normal and ten days later no trace remained of the mass under the lid or of the enlarged glands. The histologic changes agree in all respects with those of benign lymphogranulomatosis of Besnier-Boeck-Schaumann. The understanding of this disease permits the rearrangement of a certain number of disparate facts, called by different names or united under the form of various syndromes. Already there seem to be included in this granulomatosis the syndrome of uveoparotid fever and perhaps the syndrome of Mickulicz.

Jerome B. Thomas.

Ochi, S., and Huziyama, H. **Etiologic investigations of trachoma.** Ophthalmologica, 1940, v. 99, March, p. 96.

For serial passage in the testes of a rabbit, secretion from 200 persons afflicted was used, and in 22.25 percent swelling of the testes resulted. More than 5,000 rabbits were inoculated. Examination of the swollen testes for inclusion bodies showed two types of reaction. In the first, the chromatin of the nucleus of the affected cell was modified and the cytoplasm revealed threads of variable length and width. In the other, form structures resembling cocci developed in the cytoplasm, grew in size, split, and finally capped the nucleus-like Prowazek bodies. Transitions between the two forms were found. F. Herbert Haessler.

Rocha, Hilton. **Fusso-espirilar conjunctivitis.** Segundo Cong. Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 317-319.

Case report of a patient who had had conjunctivitis for more than three years. The appearance of the conjunctiva was that observed in sub-acute conjunctivitis. After three months of unsuccessful treatment with silver nitrate, argyrol, and zinc sulphate, bacteriologic examinations revealed the presence of a typical fusso-espirilar conjunctivitis. One-percent neosalvarsan ointment was applied locally, and complete cure was obtained in five days. Ramon Castroviejo.

Rötth, A. **Plastic repair of conjunctival defects with fetal membranes.** Arch. of Ophth., 1940, v. 23, March, pp. 522-525.

Fetal membranes are ideal for this purpose because they are thin, smooth, transparent, sterile, and obtainable in

large amounts. They were obtained by cesarean section and kept from one to 15 hours in tepid Locke solution. They were used in six cases of symblepharon (eight operations) and in two cases in which the socket had to be enlarged. The chorion surface is placed on the wound and the amnion forms the free surface. The fetal membranes took in every case. For three weeks they showed no change, then the graft shrunk and by ten weeks after the operation it seemed to have disappeared and the membrane left seemed to be transformed into conjunctiva. In the successful case, the course of the new vessels in the graft was like that in normal conjunctiva. This is not true of any other form of graft.

J. Hewitt Judd.

Santoni, Armando. **Research on the etiology of trachoma.** Ann. di Ottal., 1940, v. 68, Jan., p. 32.

After a brief résumé of the present knowledge of the etiology of trachoma the author accepts the view that it is an infectious disease having a specific agent, transmissible from one member of the human race to another with limitations dependent on the potency of the infection and individual resistance. Inoculation of simians with infectious material will develop a localized folliculosis on the superior palpebra.

Park Lewis.

Scala, N. P. **Keloid of the conjunctiva.** Arch. of Ophth., 1940, v. 23, March, pp. 624-625.

A case of keloid of the conjunctiva in a woman, aged 37 years, with marked subjective symptoms is reported. Clinically the picture was that of cystic degeneration of the conjunctiva and was indistinguishable from that of the more common type of such degeneration. After its removal all symptoms abated.

J. Hewitt Judd.

Szinegh, Belá. **Newer chemotherapy of ophthalmogonorrhea.** Ophthalmologica, 1940, v. 99, Feb., p. 29.

Ronin is more efficacious than any other sulphamide preparation and is best given intermittently. It should be combined with irrigations and usually cures in a few days. Because of the danger of complications, milk injections are essential.

F. Herbert Haessler.

Thygeson, Phillips. **The treatment of trachoma with sulphanilamide.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 679-685; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 395.

Townsend, J. G. **Trachoma control in the Indian service.** Sight-saving Review, 1939, v. 9, Dec., p. 280.

This article deals primarily with the encouraging reports regarding the use of sulphanilamide. In some cases to get the maximum results sulphanilamide has to be given oftener than twice a day because of its rapid excretion. Out of approximately 1,000 patients under treatment only eight developed severe clinical reactions, but 238 experienced slight reaction in the form of mild headache and dizziness.

Ralph W. Danielson.

Trapezontzeva. E. S. **Trachoma and bacillus granulosis Noguchi.** Viestnik Opht., 1940, v. 16, pt. 1, p. 61.

A detailed report of variations in technique in the agglutination reaction for trachoma, tried in the search for a more reliable technique. (Photomicrographs.)

Ray K. Daily.

6

CORNEA AND SCLERA

Arruga, H. **The corneal-transplant operation.** Ophth. Ibero-Americana, 1939, v. 1, no. 1, pp. 5-36.

This is a summary of lectures (in Spanish) given before the Faculty of Medicine of Buenos Aires and the Academy of Medicine of Rio de Janeiro. Its 31 pages are freely illustrated and include a bibliography of 37 references.

W. H. Crisp.

Atkinson, W. S., and Scullard, G. **Vaccinia with ocular involvement.** Arch. of Ophth., 1940, v. 23, March, pp. 584-590.

After reporting two cases, the authors discuss measures that offer some promise of inhibiting the action of the vaccinia virus or that will protect the cornea against becoming involved. As a result of animal experiments, it was found that potassium permanganate, tincture of iodine, metaphen, or mercury bichloride inhibited the action of the virus. Antivaccinial serum may be applied locally to inactivate the virus present on the margins of the lid and in the conjunctival secretion. The immunity may also be increased by injection of immune serum. All trauma should be avoided, as this may cause inoculation of the cornea. Since ascorbic acid has been found to inhibit the action of the vaccinia virus, administration of ascorbic acid to increase the saturation in the blood and the aqueous might possibly offer some added protection to the cornea.

J. Hewitt Judd.

Bloch, F. J. **Vortex-shaped dystrophy of the cornea.** Arch. of Ophth., 1940, v. 23, April, pp. 825-830.

The findings in the four previously reported cases are summarized, and the case of a girl aged 16 years is reported. Each eye showed a whirlpool-like arrangement of fine opacities covering the whole cornea, and consisting of rays or bundles converging toward a point slightly below the center of the cornea. The opacities consisted of small, yellowish-brown points, located in the deepest layer of the epithelium, and which the author believes to be melanin. Observation of another case in which channels of clearing occurred in a sector opacity suggests that originally a sheet of melanin granules covered Bowman's membrane and that some unknown agent filtering from the anterior chamber formed the clear channels, either by dissolving the melanin or by converting it into its colorless mother substance. The striking appearance of the eyes is shown by drawings.

J. Hewitt Judd.

Chow, T. T., and Chang, L. W. **A unique case of radiating folds of Descemet's membrane.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 689-692.

Egerov, I. **Regeneration of corneal nerves following corneal section.** Viestnik Opht., 1940, v. 16, pt. 1, p. 3. (See Section 2, Therapeutics and operations.)

Eggers, Harry. **Necroscleritis nodosa associated with chronic rheumatoid polyarthritis.** Arch. of Ophth., 1940, v. 23, March, pp. 501-506.

A white woman aged 37 years presented bilateral scleral abscesses and nodules with simultaneous involvement of the bones and joints. Fragments of the outer wall of the nodule were found histologically to be inflammatory tissue. Several drops of moderately viscid, yellowish-brown fluid was obtained and a culture taken, but

no organisms recovered. About a month later all vision was lost, due to massive bilateral hemorrhages into the vitreous. Shortly before the patient's death. sclerosing keratitis developed in the right eye. J. Hewitt Judd.

Gözcü, N. I. **Three cases of disciform keratitis.** Türk Oft. Gazetesi, 1938, v. 2, pt. 10, p. 477 (French abstract: 1938, v. 2, pt. 11, p. 584.)

Three cases of this rare form of keratitis are reported. One of the cases followed herpes zoster ophthalmicus, and the second a febrile malady. In the treatment the author recommends short-wave diathermy.

George H. Stine.

Gözcü, N. I. **A case of honeycombed corneal opacities.** Türk Oft. Gazetesi, 1938, v. 2, pt. 11, p. 533. (French abstract: 1938, v. 2, pt. 12, p. 604.)

A girl aged ten years had had bilateral corneal opacities and ocular hypertension since the age of four. In the right eye the opacity was located in the nasal cornea, and was composed of white lines in a hexagonal form resembling a honeycomb. Between the border of the lesion and the limbus there was vascularization. The left eye showed a similar lesion all around the periphery of the ectatic cornea. The author believes these opacities to be due to early fibrous degeneration caused by the ocular hypertension. Medical treatment was of no avail and bilateral trephining was done.

George H. Stine.

Hesse, Erich. **Contribution to the onset and heredity of lattice keratitis.** Graefe's Arch., 1940, v. 141, pt. 1, pp. 1-19.

The author describes lattice dystrophy of the cornea in eight members of three generations of a family. From the history, he believes that 12 members of this family were afflicted in four generations. The appearance of the corneal lesions is illustrated by four drawings. According to the writer, lattice keratitis may occur in three forms: (1) as fine, anastomotic lines, seen first in the center of the cornea, (2) as polygonal or star-shaped opacities in the axial portion of the cornea, and (3) as circularly coursing opaque streaks at the periphery of the cornea. In the differential diagnosis, lattice keratitis must be distinguished from herpetic disease, recurrent erosion of the cornea, superficial punctate keratitis, and eczematous keratoconjunctivitis.

Charles A. Perera.

Krachmalnikov, L. L. **The clinical symptoms and classification of meibomian keratitis.** Viestnik Opht., 1939, v. 15, pt. 5, p. 84.

The author describes three forms of this keratitis: (1) acute abortive meibomian keratitis, a bilateral type lasting ten days; (2) ulcerative meibomian keratitis, a torpid form with deeper marginal infiltrates; and (3) circumscribed meibomian keratitis, a vascularized form limited to a corneal segment. Ray K. Daily.

Kunina, S. L. **Treatment of trachomatous pannus with silver nitrate, after Hurvich.** Viestnik Opht., 1940, v. 16, pt. 1, p. 65.

The distinctive feature of the Hurvich method is the application of a 2-percent solution of silver nitrate by instillation, so that it reaches not only the conjunctiva but also the cornea. Clinical experience on thirty cases convinces the author of the effectiveness of this form of therapy and of its freedom from complications. Ray K. Daily.

Meyer, C., and Lubisco, H. **Zonular dystrophy of the cornea.** Ophth. Ibero-Americana, 1939, v. 1, no. 4, pp. 253-273.

After a preliminary review (in Portuguese) of the literature of the subject, the author describes personal cases. The ages of the first three patients were 44, 64, and 24 years respectively. The age of the fourth patient is not given.

W. H. Crisp.

Orzalesi, F. **Researches on the glycolysis and respiration of the cornea.** Boll. d'Ocul., 1939, v. 17, July, pp. 509-522.

In tabulated form the writer gives the result of his experiments on the respiration and glycolysis of the cornea in the rabbit, albino rat, and man. He found that the high metabolism of the epithelial and endothelial layers is inversely proportional to the body size of the animals, the metabolism of the entire cornea, and its thickness. The thickness of the cornea is proportional to the parenchyma which has a very slow metabolism. (Bibliography.)

M. Lombardo.

Orzalesi, F. **Researches on glycolysis and respiration of the cornea of the albino rat in avitaminosis A.** Boll. d'Ocul., 1939, v. 17, June, pp. 442-454.

In albino rats suffering from keratomalacia, the respiration and glycolysis of the cornea, measured by the manometric method of Warburg, showed an increased metabolism as compared to that of normal control corneas. It is the opinion of the writer that the changes in the metabolism of these diseased corneas must be considered as a result of structural changes in the corneal tissue. (Bibliography.) M. Lombardo.

Petrosiantz, E. A. **Biomicroscopy of conserved cadaver eyes.** Viestnik Opht., 1940, v. 16, pt. 1, p. 57.

Forty eyes, kept on ice in various preservatives, were subjected to daily examination with the slitlamp and corneal microscope. The data show that eyes kept at a temperature of +2 to 4° Centigrade undergo changes which increase in intensity with the period of conservation. In the cornea the epithelium becomes irregular, opaque, and edematous; the opacity becomes pronounced on the seventh day, when erosions appear. Changes in the posterior layers of the corneal parenchyma appear on the first day, and in the anterior layers on the second day. The cornea remains transparent during the first 8 to 10 days, becomes semitransparent in 15 days, and opaque in 20 to 25 days. It remains transparent longest placed in 1 to 2,000 brilliant green with the cornea upward. The tension of the eye fell most rapidly in eyes conserved in blood or in aqueous humor. The clinical data indicate that these changes in the cornea apparently have no effect on the fate of the corneal transplant. This justifies the assumption that the corneal changes in the early days of conservation are not irremediable and do not prevent the cornea from returning to normal. Ray K. Daily.

Scherschewskaya, O. J. **Keratoplastic experiments with formalinized transplants.** Ophthalmologica, 1940, v. 99, Feb., p. 4.

In 37 corneal transplants in rabbits, 12 healed. Of these, three remained clear. Of five keratoplasties in man, one remained clear. These results convince the author that the use of transplants hardened in a solution of formaldehyde is a promising procedure.

F. Herbert Haessler.

Shartz, S. E. **Tarsorrhaphy as a therapeutic procedure in some corneal**

diseases. Viestnik Opht., 1939, v. 16, pt. 1, p. 33.

The author considers this procedure as the ideal method for ocular immobilization. It produces a natural elastic pressure bandage shielding the eye from external influences and in the author's experience is very effective in the treatment of corneal ulcers. A tarsorrhaphy definitely hastened the regression of purulent corneal processes and promoted cicatrization in injuries, ulcers, and herpetic keratitis. It stimulated early vascularization and relieved the patient of pain, lacrimation, and photophobia. Stitch infection with edema of the lids, pain, and purulent secretion calls for immediate splitting of the lids. Ray K. Daily.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Baldenweek, Tillé H., and Mounier. **The ophthalmoscopic aspect of a tuberculous choroiditis verified histologically.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 449.

A case report. (Illustrations.)

Bollack, J., and Aurenche, A. **Iritis and optic neuritis in the course of a case of ictero-hemorrhagic spirochetosis.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 580.

This report of a case of infectious jaundice (Weil's disease) calls attention to the frequent occurrence of ocular symptoms, and demonstrates once more the affinity of the spirochete of Inada and Ido for the eyeball and optic nerve. Jerome B. Thomas.

Bonnet, P. **Miliary granulations of the iris. Their etiologic value.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 478.

A young woman had numerous gray, miliary, semi-translucent granulations of the pupillary portion of the iris. The author believes that the presence of such granulations should cause the oculist to suspect general tuberculosis, though they have not been proven to be true tubercle granulations from either the histologic or bacteriologic point of view. Jerome B. Thomas.

Gözcü, N. I. **Regarding some cases of recurring aphthous stomatitis probably due to infectious virus, accompanied by optic neuritis and iritis.** Türk Oft. Gazetesi, 1938, v. 2, pt. 12, p. 587. (French abstract: v. 2, pt. 12, p. 607.)

The author reports the case of a man thirty years of age who two years previously had shown aphthous manifestations of the buccal mucosa and scrotum, accompanied by seborrheic and allergic cutaneous eruptions. Ocular complications, iritis with hypopyon, serous neuroretinitis, and finally retinal endoperiarteritis occurred nine months later, first in the left eye and then in the right. Treatment was of no avail. The author cites three similar cases seen by Behcet which were improved after dental treatment. The fourth case was that of a man 35 years of age who had been operated upon ten years previously for sarcoma of the testicle.

George H. Stine.

Henderson, J. W., and Benedict, W. L. **Essential progressive atrophy of the iris.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 644-650.

McMenemey, W. H. **Laboratory aids in the detection of etiological factors in iridocyclitis.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 817.

Laboratory tests for syphilis in-

clude dark-field examination, complement-fixation, and flocculation tests. Tuberculosis may be indicated by intracutaneous or patch tests, or by the sedimentation rate. Diabetes mellitus can be verified by a blood-sugar determination.

In septic conditions, in the absence of leucocytosis a recording of the count of the number of nuclei in the polymorphonuclear leucocytes may be of value. Beulah Cushman.

Mikaelian, P. X., and Zarkhi, B. H. **The effect of irritation of peripheral nerves on infections of the anterior chamber in rabbits.** Viestnik Opht., 1939, v. 15, pts. 3-4, p. 130.

In this laboratory study peripheral irritation was produced by section of the sciatic nerve and injection into it of one drop of sterile castor oil. The records of this investigation show that irritation of the peripheral nerve long in advance of the infection had no effect, but irritation simultaneous with the infection reduced the severity of the infectious process.

Ray K. Daily.

Mistretta, R. **A free cystoid formation in the anterior chamber.** Boll. d'Ocul., 1939, v. 17, June, pp. 469-476.

A brownish semitransparent spheroidal body 1.5 mm. in diameter in the anterior chamber was freely movable on movements of the patient's head. Remnants of pupillary membrane were visible. The pathogenesis of the formation is discussed. (Bibliography, 2 figures.)

M. Lombardo.

Rados, Andrew. **Bilateral uveitis associated with detachment of the retina (Harada's disease).** Arch. of Ophth., 1940, v. 23, March, pp. 534-544.

Two cases are reported in which there was sudden onset of bilateral low-grade uveitis, with detachment of the retina which healed without surgical intervention. Detachments in both were rather extensive and presented no holes or tears. The clinical course differed widely in the two cases. In the first the inflammation was marked, resulting in seclusion of the pupil and complicated cataracts, while in the second case the inflammatory symptoms were distinctly milder and the patient recovered normal vision in one eye and nearly normal vision in the other. The primary cause of the detachment is the uveitis, which seems to differ in intensity and expansion. In some cases only the posterior segment of the uvea is involved and in others the uveitis extends into the anterior segment. Some cases appear to be caused by a virus, while others seem to have a tuberculous origin.

J. Hewitt Judd.

Samoilov, A. I., and Asarova, H. C. **Retinal edema in tuberculous choroiditis.** Viestnik Opht., 1939, v. 15, pt. 6, p. 23.

A report of four illustrative cases. The authors contend that indications for tuberculin therapy are to be sought not in the ophthalmoscopic picture of the fundus, but in the results of functional tests. Enlargement of the blind spot following injection of small doses of tuberculin is diagnostic of an active tuberculous focus in the uveal tract. Shrinking of the scotoma following calcium ionization is diagnostic of retinal edema, and disturbances in dark adaptation are indicative of a toxic effect of the choroidal focus on the retina. Such findings indicate the presence of an active process in which tuberculin therapy is indicated. (Illustrations.) Ray K. Daily.

Siniscal, A. A. **Iritis due to bacteria and bacterial toxins associated with dental sepsis.** Arch. of Ophth., 1940, v. 23, April, pp. 705-719.

A review of the literature is given relative to the clinical aspects of iritis and dental sepsis and the experimental work previously reported. In order to ascertain the effects of bacteria and bacterial toxins associated with dental infections on the iris of laboratory animals, five series of experiments were conducted. Iritis failed to develop in albino rabbits after the administration of bacterial toxins by various routes. However, when bacterial organisms associated with dental sepsis in man were injected, they produced iritis. In the rabbits previously given injections of bacterial toxin, iritis subsequently developed when bacteria were injected.

J. Hewitt Judd.

8

GLAUCOMA AND OCULAR TENSION

Barkan, Hans. **Use of the Shahan thermophore in hypotony of the eyeball as a result of the Elliot trephining operation.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 692-693.

Burke, J. W. **Field changes after satisfactory filtration operations for glaucoma.** Amer. Jour. Ophth., 1940, v. 23, June, pp. 657-661; also Trans. Amer. Ophth. Soc., 1939, v. 37, p. 149.

Bursuk, G. G. **The relief of pain in absolute painful glaucoma.** Viestnik Opht., 1940, v. 16, pt. 1, p. 20.

The author conceives the pathogenesis of pain perception on a "dynamic" rather than on an anatomic basis. The relief of pain in absolute glaucoma following a surgical procedure is due just as much to the effect of the surgical procedure on the cerebral nerve centers as on its local effect; as proof of this he cites the fact that the relief of pain following glaucoma operations has no direct relation to the drop in intraocular tension. On this assumption any intraocular operation will serve to relieve the pain, and the operation most free from complications is the procedure of choice. The author prefers and finds effective scleral trepanation posteriorly close to the equator. Ray K. Daily.

Deffin, Vincente. **Autohemotherapy in glaucoma.** Jour. Philippine Islands Med. Assoc., 1939, v. 19, Nov., pp. 683-686.

A series of six cases of acute congestive glaucoma are reported in which autohemotherapy was used, but no details as to technique are given. With the exception of one case there was a marked but temporary fall in the intraocular pressure, which tended to rise in three to four days. T. E. Sanders.

Epstein, H. D. **The relation of glaucoma to disease of the nasal sinuses.** Viestnik Opht., 1940, v. 16, pt. 1, p. 54.

An analysis of one hundred glaucoma patients shows no etiologic relation between glaucoma and nasal sinusitis. Ray K. Daily.

Gözcü, N. I. **A case of honeycombed corneal opacities.** Türk Oft. Gazetesi, 1938, v. 2, pt. 11, p. 533. (French abstract: 1938, v. 2, pt. 12, p. 604.) (See Section 6, Cornea and sclera.)

Sédan, Jean. **On the treatment of glaucomatous states in cases of aniridia.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 615.

Two case reports. Eleven references.

9

CRYSTALLINE LENS

Bencini, Alberto. **The thyro-parathyroid system and the crystalline lens.** Boll. d'Ocul., 1939, v. 17, June, pp. 425-441.

Of four dogs which had been thyroparathyrectomized three died with symptoms of tetany. One which survived developed bilateral partial cataracts which become total after symptoms of progressive thyreoprival cachexia appeared. Another group of four dogs, in which the thyroid had been only partially removed, remained alive for two years. Three of these died with symptoms of tetany after the hypertrophied thyroid remnant was removed. One, which had had some of the thyroid transplanted into the anterior chamber, afterward showed a partial cataract, which never became total. (Bibliography, 8 figures.)

M. Lombardo.

Gloor, A. **Observations on stereoscopic-binocular single vision in unilateral aphakia (following cataract extraction).** Schweiz. med. Woch., 1939, v. 69, Dec., p. 1120. (See Section 3, Physiologic optics, refraction, and color vision.)

Gözberk, Rifat. **Congenital cataract and hereditary syphilis.** Türk Oft. Gazetesi, 1937, v. 2, pt. 8, p. 373. (French abstract: 1938, v. 2, pt. 10, p. 530.)

Three cases are reported, the first a child ten years of age (of syphilitic parents) who showed cataract, hypothyroidism, and microcephalus. The second case was that of a girl of eleven years who had bilateral cataract, myxedema, and spastic hemiplegia. The third case was of bilateral cataract, hypothyroidism, and spastic paraplegia in a girl 11 years of age. The blood Wassermann in this case was negative. In all three cases the cataracts were apparently due to hypothyroidism of syphilitic origin. George H. Stine.

Krause, A. C. **Medical treatment of senile cataract.** Arch. of Ophth., 1940, v. 23, March, pp. 487-490.

Since it is known that some hereditary diseases can be treated, and since the time factor of senescence can be modified in the laboratory, it is not unreasonable to believe that the study of senescence, heredity, and biochemistry will eventually lead to a medical treatment for cataract. The question arises whether or not cataract is a primary result of senescence or a secondary response to alterations in the equilibrium of the body fluids during the aging process. Of course there is no possibility of reversing the change which has occurred in a mature or hypermature senile cataract, but there is a possibility that the primary causal factor and the secondary factors which initiate or hasten the maturity of the cataract may be influenced to prevent or retard the cataractous process.

J. Hewitt Judd.

McLean, J. M. **A new corneoscleral suture.** Arch. of Ophth., 1940, v. 23, March, pp. 554-559.

A small conjunctival flap is dissected down to the limbus around the entire upper half of the eye. At the base of the flap a small slot is made with a Lundsgaard knife about half way through to the anterior chamber. A fine, black silk suture on Kalt's corneal needle is then run through the base of the conjunctiva, reversed, and run through both the scleral and the corneal margins, emerging in clear cornea

just below the base of the conjunctival flap. The suture is then pulled out of the slot and the loop laid aside to allow the usual type of section. The results in 110 cases in which this suture was used are compared with those of 64 cases in which conjunctival sutures were used. Use of the corneoscleral suture has resulted in a marked reduction of gaping wounds, postoperative hyphemia, prolapse of the iris, and postoperative astigmatism. The technique is shown by drawings.

J. Hewitt Judd.

Paufique, Louis. **Unilateral myopia of high degree with strabismus. Extraction of the transparent crystalline lens.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 476. (See Section 4, Ocular movements.)

Schupfer, Francesco. **The pathogenesis of pigmented secondary cataract.** Boll. d'Ocul., 1939, v. 17, June, pp. 477-501.

Six cases of pigmented secondary cataract are described. In three of these histologic examination indicated that the pigmented mass was due to proliferation of the pigment epithelium of the iris which had reached the secondary cataract through posterior synechiae. Cell proliferation had probably resulted from traction caused by shrinking of the membrane. (Bibliography, 7 figures.) M. Lombardo.

Silva, L. and Novais, J. L. **Cataract and vitamin C.** Segundo Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 301-306.

The necessity for increased knowledge in regard to the etiology of cataract is stressed. The authors believe cataract to be due to diminution or absence of certain elements in the aqueous humor. Vitamin C, with its oxidizing action, may play an important role in the metabolism of the lens, its deficiency coinciding with the appearance of senile cataractous changes. The fact that patients affected with senile cataract present in the blood a lower concentration of vitamin C than normal individuals seems to confirm this point of view. The authors have made several observations where patients were greatly benefited by administration of vitamin C, and they advocate its use in all cases of incipient cataract. Ramon Castroviejo.

Taliercio, Aurelio. **Galactose cataracts.** Ann. di Ottal., 1940, v. 68, Jan., p. 58.

Albino rats were given 70-percent and 50-percent galactose diets respectively. Seven to eight days after the beginning of the diets, cataracts appeared. After 19 to 21 days these became mature in 90 percent of the rats given 70-percent galactose and in 60 percent of the rats given 50-percent galactose. The chemical analysis of the lenses showed a calcium increase. The p_H showed an increased alkalinity as the cataracts developed. There was slight diminution of the glycolysis in the incipiency of the cataract, perhaps more marked as maturity advanced. (1 plate, 4 figures, bibliography.)

Park Lewis.

Ter-Artuniantz, C. M., Kotilianskaja, P. I., and Chutko, M. B. **The diagnosis of lenticonus.** Viestnik Opht., 1939, v. 15, pt. 5, p. 81.

The authors report two cases with all the symptoms of posterior lenticonus. Biomicroscopy demonstrated that one was a case of anterior lenticonus, and the other was an apparent

lenticonus caused by difference in the refraction between center and periphery of the lens. The authors question the authenticity of cases reported as lenticonus without pathologic or biomicroscopic data. Ray K. Daily.

10

RETINA AND VITREOUS

Bailliart, P. **The local treatment of vascular affections of the fundus of the eye.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 451.

The author limits his report to therapeutic measures which aim directly at the globe, and calls attention to certain operations, perhaps too little used, and also to the action of certain substances injected behind and in contact with the globe. In the treatment of retinitis pigmentosa some ophthalmologists, including Magitot, have reported favorably on operations on the sympathetics, while others prefer the simple operation of Elliot. Massage of the globe continues to be a truly useful measure in cases of obliteration of the central artery. In the latter emergency one surgeon massaged the optic nerve with a strabismus hook and another devised a small forceps which enabled him to massage the artery within the nerve at its exit from the globe, with the surprising result of a return of vision to 6/10 within a week. On three occasions in cases of juvenile recurrent hemorrhage, the author has used diathermy to destroy by coagulation the points of origin of the hemorrhages. These points near the ora serrata may often be seen, well defined, when the vitreous has regained its transparency.

In the treatment of vascular affections of the fundus, retrobulbar injections of numerous solutions capable of action on the vessels have been used with success. Hypertonic solutions of sodium chloride, with or without the addition of dionin, have given especially good results in certain degenerative diseases of the fundus oculi by provoking active vasodilatation. The author uses retrobulbar injections of novocaine, 2 to 4 percent, in arterial and capillary obliterations of the fundus, and in all forms of senile degeneration of the macula. He obtains marked improvement in the spasmodic narrowing of vessels, especially in senile lesions. Retrobulbar injection of alcohol in painful affections of the eye is usually effective and especially so in painful hypertension secondary to venous lesions of the retina and choroid. Jerome B. Thomas.

Bailliart, Kalt, and Saint Martin, O. de. **A mobile embolus between two arterial bifurcations.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 576.

The patient complained of almost complete loss of vision in the right eye. Ophthalmoscopic examination revealed at the first bifurcation of the superior temporal artery a small swelling of the artery resembling an aneurism containing a small, yellow, highly refractive point. When during application of the dynamometer the pressure reached 70 mm., the swelling flattened out and the small yellow point then moved along the axis of the artery toward the papilla for about 1 mm. and disappeared. This effect could be produced at will by pressure with the dynamometer or finger. The authors note that the phenomenon is to their knowledge unique, and further that it proves the reality of embolism as a cause of obliteration of the retinal arteries.

Jerome B. Thomas.

Benstein, I. I. **Campimetric studies on the effect of calcium ionization on retinal edema.** Viestnik Opht., 1940, v. 16, pt. 1, p. 48.

The conclusion based on clinical studies is that calcium ions introduced by ionization are capable of reducing edema of the retina, as well as that of the anterior ocular segment. The basis of this conclusion is the fact that in tuberculous choroiditis, in glaucoma, and in choked disc, immediately after calcium ionization there is a reduction in the size of the blind spot. This effect is specific for calcium ions and cannot be obtained by ions of other metals. The reduction in the size of the blind spot appears within 15 minutes, reaches its maximum in 30 minutes, and lasts for about two hours. Ray K. Daily.

Bollack, J., and Wioz, A. **A case of retinochoroiditis juxtapapillaris with contraction of the upper sector of the visual field.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 586.

A case report illustrated by a photograph of the fundus.

Bonnet, P., and Bonamour, G. **Changes in the retinal veins observed ophthalmoscopically in a case of diabetes associated with arterial hypertension.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 487.

The changes in the retinal veins as reported in this case were extraordinary, the veins being enveloped or sheathed by a white mass appearing like frosted glass and bristling with crests perpendicular to the walls of the veins. Jerome B. Thomas.

Casá, Gerolamo. **"Primary" perforation of macula in the light of modern views on retinal circulation.** Boll. d'Ocul., 1939, v. 17, July, pp. 541-580.

A man of 64 years after a psychic trauma noticed a diminution of vision in both eyes. A man of 76 years after recurrent attacks of headache noticed a diminution of vision of both eyes. A neurasthenic woman of 72 years, subject to recurrent headache with blurred vision, noticed during one of these attacks after a violent emotion a rapid loss of vision in the right eye. Ophthalmoscopic examination in each case showed a typical perforation of the macula together with thin arteries and enlarged veins of the retina and sclerosis of the choroidal blood vessels. Discussing these cases the writer concludes that the non-traumatic perforations of the macula result from two components: an organic factor (angiosclerosis) and a functional factor (spasm of the retinal arteries). (Bibliography, one figure.) M. Lombardo.

Cassovski, I. H., and Khorlova, A. H. **Binocular and monocular light sensitivity of the retinal periphery.** Viestnik Opht., 1939, v. 15, pt. 5, p. 89. (See Section 3, Physiologic optics, refraction, and color vision.)

Chang, H. S., Hsieh, W. M., Lee, L. Y., and Li, T. S. **Diminution of acetylcholine content of retina after prolonged functional disuse.** Proc. Soc. Exper. Biol. and Med., 1940, v. 43, Jan., p. 140.

The amount of acetylcholine found in the dog retina after seven to 49 days of blindfolding was 11 to 25 percent less than that found in the control eyes that had not been blindfolded. In eyes blindfolded for 160 to 170 days the acetylcholine content was found to be 58 percent less than that in the control retinae. The authors concluded that the diminished acetylcholine content was due to the prolonged functional disuse.

John C. Long.

Coppez, H. **The ocular symptoms of delayed post-concussion syndrome.** Ophthalmologica, 1940, v. 99, March, p. 65.

Vertigo, headache, and asthenopia are the important subjective symptoms. Loss of visual acuity and contraction of the visual field, particularly when its exact character is unknown, are less significant. On the other hand, the objective symptoms are of great importance. These include lability of the blood pressure in the retinal arteries and a disproportion between retinal and brachial arterial pressure. These circulatory disturbances are analogous to others in the brain which have no relation to intracranial pressure. Ophthalmoscopically, the retinal hypertension is characterized by decrease in caliber of the vessels, hypotension by widening and flattening of the vessels. Another characteristic and not uncommon finding is juxtapapillary edema usually on the nasal side.

F. Herbert Haessler.

Corrado, M. **Variations in the retinal arterial pressure and that of the humeral artery studied comparatively under the action of pharmacologic (acetylcholine) and short-wave stimuli in normal and hypertensive subjects.** Ann. di Ottal., 1940, v. 68, Jan., p. 1.

These investigations were made in relation to vasodilatation and pressure of the retinal arterial circulation after the subcutaneous injection of acetylcholine. The comparisons were made immediately and following an interval of several days. The research was made on two groups of subjects. Twenty-one of these were in normal condition and 22 showed arteriosclerotic hypertension. The conclusions reached are in conformity with those of other authors that there is no constant relationship between the two phenomena as to vasodilatation and arterial pressure. It was noted that short-wave application more favorably affected the retinal circulation and acetylcholine more constantly increased the caliber of the vessels. (Bibliography.) Park Lewis.

Dubois-Poulsen, A. **The forms of retinitis called "hypertensive."** Bull. Soc. d'Opht. de Paris, Supplement, 1938, Nov., 195 pp. (Discussion, Nov., p. 546.)

Presented by request to the Société d'Ophtalmologie de Paris, as its annual report. A monograph of 200 pages including bibliography of 19 pages. (See editorial, Amer. Jour. Ophth., 1939, v. 22, March, p. 316.)

The discussion of this report occupies about 25 pages and was carried on by Terrien, Lagrange, Bailliart, Tillé, Jayle, Thurel, Fritz, Bidault, Nectoux, Kenel, and Michaux.

Jerome B. Thomas.

Elwyn, Herman. **The place of Coats's disease among the diseases of the retina.** Arch. of Ophth., 1940, v. 23, March, pp. 507-521.

The author reviews the clinical and pathologic conditions which constitute the disease entity known as Coats's disease (exudative retinitis). The vascular malformations which involve the retina and the vessels of the brain are summarized and presented in an excellent table. Telangiectasia constitutes the fundamental pathologic lesion which initiates the pathologic and ophthalmoscopic changes characterizing exudative retinitis. Slowing of the blood stream in the dilated vessels, or rupture of these vessels, is accompanied by transudation of plasma into the retinal tissues and the occurrence of hemorrhages there. The hemorrhages cause necrosis of retinal tissue, and the plasma and blood spread and extend

externally to the retina. From the plasma, fibrin is deposited in the retinal tissue. The transuded plasma and the hemorrhages incite reactive phenomena: the appearance of phagocytes derived from the cells of the layer of pigment epithelium and from histiocytes of the adventitia of vessels; and the formation of fibroblasts from mesodermal elements and by metaplasia of cells from the pigment-epithelium layer. The fibroblasts invade the hemorrhagic areas and cause an organization or encapsulation of these areas. When the hemorrhage is encapsulated, the central part is liquefied and contains remnants of blood elements and deposits of cholesterol.

J. Hewitt Judd.

Fialho, Abreu. **Hypertensive retinitis.** Segundo Cong. Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 273-291.

The author discusses the relation between albuminuric retinitis and diseases of the kidneys. The hypertensive states are reviewed. Chronic nephritis is not always responsible for progressive arterial hypertension. On the contrary, the lesions of the kidney are almost always a consequence of primary vascular affection of chronic cause and unknown etiology, the hypertension at the beginning being the most striking general symptom. The characteristic ophthalmoscopic picture, with elevation of the tension in the central retinal artery, appears rather early in the course of the disease. Only after this first stage of functional disturbances do the other organic symptoms appear, first in the kidneys, then in the heart and other organs.

Ramon Castroviejo.

Kauffmann-Cosla, O. **Contributions to the etiology and treatment of diabetic retinitis.** Ophthalmologica, 1940, v. 99, Feb., p. 16.

This discussion of specific etiologic factors in producing retinal complications of diabetes is in rather general terms. Aside from general antidiabetic therapy, the use of vitamins and ferments in a proprietary mixture called "Diet 5" is advocated.

F. Herbert Haessler.

Keys, J. E. L., and Hatcher, W. F. **The interpretation of visible pulsation in the retinal arteries.** Jour. Amer. Med. Assoc., 1940, v. 114, May 25, p. 2089.

In the authors' experience skillful and careful observation will reveal a pulsation in at least one branch of the retinal artery in as many as 80 percent of the cases that are suitable for ophthalmoscopic study. The visible arterial pulsation varies with general and local disturbances of circulation and of the eye. Statements to the effect that pulsation of the retinal arteries is always pathologic should be corrected in textbooks of ophthalmology.

George H. Stine.

Kornzweig, A. L. **Bilateral symmetric cystoid detachment of the retina.** Arch. of Ophth., 1940, v. 23, March, pp. 491-500.

This condition occurred in a man aged 33 years, in a location not previously observed, namely at the 6-o'clock position. It was found on routine examination of the eyes, and there were no symptoms referable to it. The patient had a marked compound hyperopic astigmatism. These cysts are believed to be of congenital origin, with a relatively small eye favoring their formation. Similar cases in the literature are grouped together and the possibility of a syndrome is mentioned. This syndrome would include moder-

ate to marked hyperopia and cystic formation in the lower field of the retina, occasionally bilateral, in young men. J. Hewitt Judd.

Lindner, K. **Spontaneous and traumatic retinal detachment.** Irish Jour. Med. Science, 1939, Dec., p. 813.

The author reviews the theories of the etiology and mechanism of retinal detachment, stressing his views of the role of vitreous detachment and the retinal tear. He discusses the therapy of the condition based on these theories. T. E. Sanders.

McArevey, J. B., and Somerville-Large, L. B. **Detachment of the retina replaced by operation.** Trans. Ophth. Soc. United Kingdom, 1939, v. 59, pt. 2, p. 831.

The first author reported on 29 patients operated on by the Larson technique since 1932, 14 retinas remaining in good position. In the ones that were not satisfactory he felt the bad results were due to poor localization of the hole or improper evacuation of the subretinal fluid.

The second author reported on four cases in which the retina was replaced by diathermy coagulation and puncture. One of his patients was a young man whose retina had been detached for 12 years and although complete reapposition was obtained, the field of vision remained lost. Central vision however improved.

Beulah Cushman.

McDonald, Robb. **Some basic principles of dark adaptation.** Arch. of Ophth., 1940, v. 23, April, pp. 841-451.

The problem of dark adaptation and its clinical significance are reviewed, and the chemical basis of vision and the present status of dark adaptation are discussed. The exact metabolism of vitamin A in the body or the individual daily requirements are not yet known for certain. The subjective difficulties of the test are pointed out.

J. Hewitt Judd.

Marucci, Luigi. **Tortuosity of the retinal vessels.** Boll. d'Ocul., 1939, v. 17, July, pp. 581-594.

Two cases are reported of tortuous retinal blood vessels which at the disc took the shape of a caput medusae with slight peripapillary edema. One case was of a boy 12 years old who beside some degree of mental deficiency showed other somatic changes revealing the congenital character of the fundus lesion. The other case was of a man 52 years old who showed symptoms of local and general arteriosclerosis. The etiopathogenesis of the vascular anomaly is discussed. (Bibliography, 4 figures.) M. Lombardo.

Michaux. **Treatment of obstructions of the retinal vessels by retrobulbar injections of acetylcholine followed by intramuscular injections of cobra venom.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 605.

The author reports seven cases upon which he bases the following conclusions: (1) In order to obtain a rapid and complete effect upon obstructions of the retinal vessels, one must practice repeated retrobulbar injections of acetylcholine, between 5 and 10 cg. to the dose. (2) The action of the acetylcholine should be reënforced with intramuscular injections of cobra venom. (3) The appearance of the Claude Bernard-Horner syndrome during the days following the injection offers a favorable prognosis, as the paresis or paralysis of the terminal filaments of the sympathetic augment the effect of

acetylcholine. (4) If the first injection of acetylcholine is not followed by notable improvement in visual acuity it is useless to continue the injections. (5) The initial improvement, usually rapid at first, may lessen in a few weeks, and may necessitate a repetition of the retrobulbar injection. The visual acuity may improve months after the treatment. (6) To assure lasting results the patient should submit to a sustained treatment in which acetylcholine, cobra venom, and benzyl benzoate play the primary role. (7) Of the seven patients reported, two were completely cured, three were partially cured, and two were improved less than 1/10. In two cases the obstructions were arterial, in five venous.

Jerome B. Thomas.

Mozzetti, Marzio. **Anomalies of retinal blood vessels and particularly cirsoid aneurysm of retina.** Boll. d'Ocul., 1939, v. 17, June, pp. 455-468.

A boy of 16 years having vision of 1/10 in the right eye and hand movements in the left showed bilateral cirsoid aneurisms of the retina. The papilla was barely visible and the veins appeared to be larger and more tortuous than the arteries. An angiomatous cyst had previously been removed from the right submaxillary region, and hyperchromic telangiectatic spots were seen on his nose and cheeks. He suffered from attacks of headache and was retarded intellectually. Radiography of the head showed increased diploic circulation and other signs of increased intracranial pressure. (Bibliography.) M. Lombardo.

Pett, L. B., and LePage, G. A. **Vitamin-A deficiency.** Jour. Biol. and Chem., 1940, v. 132, pp. 585-593.

A definite correlation was found between the vitamin-A level in the blood, as determined by a new chemical method, and the Pett light-adaptation test for vitamin-A deficiency.

T. E. Sanders.

Pillat, A. **Does a war hemeralopia exist?** Münch. med. Woch., 1940, v. 87, March 1, pp. 225-229.

Opposing the views of many authors (Löhlein, Birch-Hirschfeld, Wessely), Pillat answers this question affirmatively. Hemeralopia is caused by vitamin-A deficiency and war is only one of many possible causes for it. The vitamin-A content of the retina may be reduced under three circumstances: (1) The vitamin-A level in the blood is reduced (general A-avitaminosis). (2) Sufficient vitamin A is in the blood, but retinal circulation is decreased (angiosclerosis, glaucoma, chorioretinitis, senile changes of the lamina basalis chorioideae, ablatio retinae). (3) Enough vitamin A reaches the retina, but pigment epithelium and neuroepithelium have lost their faculty to transform it into visual purple (tapetoretinal degenerations). The vitamin-A retinal deposits may also be rapidly exhausted by intense light as this hastens the metabolic processes in the retina and increases the amount and speed of formation of the visual purple.

War hemeralopia thus does not differ from the essential or epidemic type, and may also be associated with Bitot spots, prexerosis of the cornea, pigmentation of the conjunctiva, and in the most severe instances with keratomalacia. Its treatment and prevention are the same, and it is chiefly a nutritional problem.

Bertha A. Klien.

Pimentel, P. C. **Retinal angiitis.** Segundo Cong. Brasileiro de Ophth. In

Arquivos de Clín. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 328-329.

Report of a case of primary inflammation of the walls of the retinal vessels with no other apparent symptoms. Vision was reduced to counting fingers at one meter. Ophthalmoscopic examination revealed the retinal vessels covered with exudates forming a sheath around the vessels. Small white points were distinguished between the disc and the macula. The Wassermann was positive. After treatment for six months vision increased to 20/10. The vessels remained permeable, although sclerosed. The author agrees with Bedell that the white exudates observed along the vessels are due to infiltration of the lymphatic perivascular sheaths. Ramon Castroviejo.

Rachevski, F. A. **Biochemical studies of the vitreous.** Viestnik Opht., 1940, v. 16, pt. 1, p. 27.

The vitreous of 17 eyes was examined for dry residue, albumen content, the form of the albumen-globulin fraction, chlorine, calcium, potassium, glutathione, and cholesterin. The blood of patients from whom these eyes were enucleated was subjected to the same tests. The data show that relative to albumen and chlorine, Ascher's law established for the aqueous applies also to the vitreous. The proportion of anions and cations in the blood and vitreous follows Donnan's equilibrium theory, even when the albumen in the vitreous is equal to or exceeds the blood content, and the capillary walls cease to be semipermeable.

Ray K. Daily.

Rados, Andrew. **Bilateral uveitis associated with detachment of the retina (Harada's disease).** Arch. of Ophth., 1940, v. 23, March, pp. 534-544. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Rossano, R., and Vallès, A. **Retinitis pigmentosa of familial character. Incomplete syndrome of Lawrence Biedl.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 443.

The observations relate to five persons belonging to two later generations of a family affected with pigmentary retinitis. The genealogic tree accompanying the report shows that the malady seems to extend back at least two generations before those examined. In one subject the pigmentary retinitis was associated with a paralysis of the functions of lateral gaze and of convergence, and with polysyndactyly. In the second subject there existed in the same eyegrounds retinitis pigmentosa and punctate albescent retinitis, a rare condition and one suggesting an identical pathogenesis of the two forms of retinitis. The hereditary transmission is said to be remarkable in that it is absolute in continuity and is not sex-linked. For these reasons the authors make a tentative classification of this family as of the dominant mendelian type of heredity.

Jerome B. Thomas.

Ryan, E. P. **Angiomatosis retinae.** Arch. of Ophth., 1940, v. 23, March, pp. 623-624.

A boy aged 13 years presented immense, dilated, tortuous and distorted "intestine-like" vessels covering the papilla and the immediate surroundings particularly the temporal side. No cyst-like formation or structure was found at the periphery of the fundus. There was no exudate, hemorrhage, or retinal detachment. (Drawing.)

J. Hewitt Judd.

Samoilov, A. I., and Asarova, H. C. **Retinal edema in tuberculous choroiditis.** Viestnik Opht., 1939, v. 15, pt. 6, p. 23. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Strebel, J. **Operation for retinal detachment.** Schweiz. med. Woch., 1939, v. 69, Dec., p. 1121.

Strebel describes six cases which he operated upon with good results and discusses the indications for catholysis and diathermy procedures. He discusses further the relationship between retinal detachment and general diseases and the technical improvements in surgery. Theodore M. Shapira.

Venco, Luigi. **The sphygmoscopy of the retina applied to the study of the cardiac rhythm.** Boll. d'Ocul., 1939, v. 17, July, pp. 531-540.

Venco discusses the possibility of observation of changes in cardiac rhythm by noting the corresponding changes in the retinal blood vessels. The most interesting changes are those observed in asystoly, extrasystoly, and total arhythmia. M. Lombardo.

Wohl, M. G., and Feldman, J. B. **Vitamin-A deficiency in diseases of the liver: its detection by dark-adaptation method.** Jour. Lab. and Clin. Med., 1940, v. 25, Feb., p. 485.

Twenty-five patients with various types of liver disease were studied. Ten patients with alcoholism, but without clinical evidence of liver disease, were also examined. In 21 patients with liver disease the dark adaptation was pathologic. All patients with cirrhosis of the liver, including the syphilitic type, showed degrees of pathologic dark adaptation, varying from 204 to 19,600 microphotons. (Normal dark-adaptation threshold is up to 150 microphotons within thirty minutes.) of seven patients with hepatocellular jaundice, three presented normal dark adaptation and a minimal degree of liver damage. The remaining four patients showed evidence of liver damage and pathologic dark adaptation. In these four cases the degree of liver damage, as evidenced by the icterus index and other laboratory studies, appeared to run parallel with the degree of dark-adaptation pathology. Nine out of ten alcoholic addicts showed vitamin-A deficiency as revealed by dark-adaptation pathology. (14 references.)

Ralph W. Danielson.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Bollack, J., and Aurenche, A. **Iritis and optic neuritis in the course of a case of ictero-hemorrhagic spirochetosis.** Bull. Soc. d'Opht. de Paris, 1938, Dec., p. 580. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Costen, J. B. **The status of retrobulbar neuritis in paranasal sinus disease.** Southern Med. Jour., 1940, v. 33, Feb., p. 170.

The author reviews the rather conflicting reports in the literature concerning the relationship of retrobulbar neuritis to sinus disease. Thirteen cases of severe acute visual loss are reported. Eight of these were diagnosed as chorioretinitis and four as hemorrhagic retinitis. All responded more or less rapidly to surgical measures, such as drainage of the sinuses or removal of the tonsils. Only two were treated conservatively by irrigation of the sinuses and one of these recovered without permanent injury to the eyes. Secondary

atrophic changes must have occurred in the other. (Discussion.)

John C. Long.

Fetterman, J. L., and Chamberlain, W. P., Jr. **Syndrome of neuromyelitis optica.** Arch. of Ophth., 1940, v. 23, March, pp. 577-583.

A girl aged 17 years suffered from an acute, bilateral optic neuritis plus diffuse myelitis. The blindness preceded the definite signs of involvement of the spinal cord, which was manifested by complete paralysis of both legs, loss of sphincter control, and marked hypesthesia of the legs and thighs. In the course of several months, the patient completely regained the vision in the left eye and had only a minimal impairment in the right. There was almost total return of both sensory and motor function. The authors point out the difficulties in distinguishing papillitis from papilledema, and state that they consider neuromyelitis optica to be a descriptive designation for what is most likely only a form of multiple sclerosis.

J. Hewitt Judd.

Gözcü, N. I. **Regarding some cases of recurring aphthous stomatitis probably due to infectious virus, accompanied by optic neuritis and iritis.** Türk Oft. Gazetesi, 1938, v. 2, pt. 12, p. 587. (French abstract: v. 2, pt. 12, p. 607.) (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Hartmann, E., David, M., and Guillaumat, L. **Papillary stasis and syphilis.** Bull. Soc. d'Opht. de Paris, 1938, Oct., p. 461.

The authors report three cases of cerebral syphilis with choked disc. In the first case a large, isolated gumma of the frontal lobe caused the papillary stasis. In the second case a walled-off meningitis of the posterior fossa with stenosis of the inferior orifice of the fourth ventricle and distention of the lateral and median ventricles was partly responsible for the papillary edema. In the third case an acute encephalitis was accompanied by extensive edema, both cerebral and papillary. These cases illustrate the fact that prompt surgical intervention is necessary at times to preserve vision, and further that antisyphilitic treatment is more effective after a decompressive trephining. In the first case (frontal gumma) it is noteworthy that though the Wassermann and Kahn reactions were strongly positive in the blood they were negative in the cerebrospinal fluid. They were positive in the cerebrospinal fluid of the encephalitis patient.

Jerome B. Thomas.

Kravitz, Daniel. **Treatment of syphilis of the central nervous system with tryparsamide, with particular reference to the ocular complications.** Brooklyn Hosp. Jour., 1940, v. 2, Jan. p. 33.

A series of 40 cases of neurosyphilis treated with tryparsamide is reported. Fifteen, or 37½ percent, had optic atrophy. Seven cases, or 17½ percent, developed subjective symptoms, three of these having optic atrophy. The most frequent subjective symptom was blurred vision, but dazzling sensations and floating streaks were common. There was no case of sudden visual loss. In one case only was the drug stopped because of ocular complaints. In another case it was discontinued because of precordial pain. The author concludes that tryparsamide is not contraindicated in luetic optic atrophy. He believes that the drug seems to retard its advancement and may prevent its development. He also concludes that

subjective symptoms are not enough to cause the withholding of tryparsamide.

T. E. Sanders.

Rocha, Hilton. **Ophthalmoscopic aspect of malaria therapy.** Segundo Cong. Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 357-371.

The author studied 23 cases of neurolues treated by malaria therapy. In one case the patient died; in seven cases no change could be observed; in one case the photomotor reflexes were slightly improved, in five cases these reflexes were aggravated. Seven cases showed modifications of the papilla which were not present before the treatment was instituted; one case developed anisocoria; three cases of atrophy of the optic nerve did not show any improvement, and one became worse with the treatment. As a prophylactic measure against fatal accidents in malaria therapy, the author advises electrocardiograms taken systematically to detect possible undiagnosed cardiac lesions. The author believes that malaria therapy may bring about reactivation of the syphilitic process, as had happened in two of his cases.

Ramon Castroviejo.

Rub, B. M. **Involvement of the optic nerve in serous meningitis.** Viestnik Opht., 1939, v. 15, pt. 5, p. 76.

A report of five cases, one of descending optic neuritis, one of choked disc, and three of optic atrophy. The etiologic factor was a mild serous meningitis. Lumbar puncture is a valuable diagnostic as well as therapeutic procedure. In neglected cases the puncture may prove therapeutically ineffective.

Ray K. Daily.

Silva, Linneu. **Pathology and treatment of quinine amaurosis.** Segundo Cong. Brasileiro de Ophth. In Arquivos de Clin. Oft. e Oto-Rino-Laring., 1938, v. 5, Sept.-Dec., pp. 292-300.

There are two theories to explain the effect of quinine on the visual apparatus: direct action on the retinal elements, and indirect action by attacking the circulatory system. There seems to be no doubt about the direct action of the drug on the circulatory system, as shown by the ischemia of the retina observed in these cases. It cannot be accepted that this ischemia is due to vasoconstriction produced by the drug, because quinine acts as a vasodilator when high doses are given. Only when small doses are given has the drug a vasoconstrictor effect. The author attributes the amaurosis to the imbalance between the intraocular pressure, which remains normal, and the general blood pressure, which is lowered. This results in disturbances of the metabolism of the retina as a consequence of the ischemia. The treatment must be directed, therefore, toward raising the general blood pressure by heart tonics and vasoconstrictors and at the same time diminishing the ocular tension with miotics. In severe cases it may be advisable to perform paracentesis of the anterior chamber, in order to improve the intraocular circulation.

Ramon Castroviejo.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 South Kingshighway, Saint Louis

News items should reach the Editor by the twelfth of the month

Deaths

Dr. John David Moore, Bloomfield, New Jersey, died May 12, 1940, aged 64 years.

Miscellaneous

The American Board of Ophthalmology announces that there will be only one written examination during 1941.

Candidates enrolled in the preparatory group who have been advised that they will be eligible for examination during 1941 should make application at once to take this written examination.

Application must be made on the regular blanks provided for the purpose and must be received in the board office before December 1, 1940. Oral examinations, 1941, in Cleveland, May and June, deadline for case reports February 1st; also October (place to be announced later), deadline for case reports July 1st.

An examination will also be held on the Pacific coast during 1941, provided a sufficient number of candidates make application for this special examination.

If you plan on taking your examination during 1941, please write at once to the board office for formal application blanks, indicating your preference of examination place. American Board of Ophthalmology, 6830 Waterman Avenue, Saint Louis, Missouri.

How eye accidents are prevented in industry, through education of workmen and the use of goggles, masks, and other protective equipment, is dramatically portrayed in "The eyes have it," a new sound slidefilm sponsored by the National Society for the Prevention of Blindness.

Combining humor with a serious presentation of the factors responsible for eye accidents in industrial plants, this educational film is intended for groups of workmen and foremen as well as safety directors. It was produced and directed by Harry Guilbert, a member of the Industrial Advisory Committee of the National Society for the Prevention of Blindness. Mr. Guilbert is director of the Bureau of Safety and Compensation for the Pullman Company.

The tragedy of blindness resulting from carelessness is contrasted with the absence of eye injuries where hazards are recognized and a continuous safety campaign is conducted. The importance of the problem, which is presented graphically and simply in this film, may be judged from these facts:

There are in the United States today close to 8,000 persons who have been blinded by the eye hazards of industrial occupations and more than 80,000 persons who have lost the sight of one eye as a result of these hazards. To this total there are added each year at least 75 persons who lose the sight of both eyes and 2,000 persons who lose the sight of one eye because of industrial or occupational hazards. The number of men and women in industry who lose permanently part of the vision of one or both eyes undoubtedly runs into tens of thousands each year.

Inquiries concerning the film should be addressed to the National Society for the Prevention of Blindness, 50 West 50th Street, New York City.

Another report from this society pertaining to Fourth of July accidents is as follows:

"Reports of serious fireworks accidents received by the American Medical Association from hospitals and clinics last year totaled 5,560. These included 158 major eye injuries, many of which resulted in total blindness.

"Nine states now have laws forbidding the sale or possession of fireworks, except for community displays under the supervision of pyrotechnic experts. Such a law was adopted in New York state this year, but it does not become effective until August 1st. Other states which previously adopted fireworks legislation are New Jersey, Delaware, Pennsylvania, West Virginia, Indiana, Michigan, Iowa, and Utah. There is also some regulation of fireworks in Kentucky, Illinois, California, and Wisconsin.

"The effectiveness of state laws has been demonstrated wherever they have been adopted; the immediate result is a tremendous reduction of deaths, blindness, and other serious injuries from this cause. City ordinances are not sufficient, as every city is surrounded by good roads leading to suburban towns where fireworks are sold openly and legally."

Personals

Dr. Daniel B. Esterly is now associated with Dr. William Humes Roberts in the practice of ophthalmology, Suite 505, Professional Building, 65 North Madison Avenue, Pasadena, California.

Mr. Arnold Sorsby will deliver the Montgomery Lecture at the annual meeting of the Irish Ophthalmological Society in Dublin, in May of 1941.

Dr. Winfred L. Post was recently made chairman of the committee on sight conservation of the Missouri Medical Society.

Dr. Arthur A. Siniscal announces the opening of his office at 147-149 Prospect Street, Passaic, New Jersey, on or about August 1, 1940.